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Introduction

INTRODUCTION

The City of St. Louis (City) and the Missouri State Highway Department (MSHD) have long recognized Route 755 as a key part of the transportation plan necessary for the revitalization of the City. Construction of the freeway (shown on Figure 1) will relieve serious traffic flow restrictions at the present interchange of I-44 and I-55, on north-south City arterials, on residential streets, and I-70--I-55 downtown. The existing freeway system was designed with Route 755 as an integral part of the overall system to handle the area's anticipated future traffic growth. Without this vital link, the entire system is inadequate and cannot function as planned.

In April, 1979, the City contracted with Booker Associates, Inc., (Booker) for professional and technical services to review Route 755's preliminary design as prepared by MSHD in terms of specific engineering design aspects and mitigation of various adverse environmental impacts.

To accomplish the objectives of the study, Booker collected additional data from MSHD and other agencies, held meetings with various City Agencies through the review and evaluation phase to assure complete understanding and agreement of the various design elements being analyzed and the types of alternative solutions compatible with the City's goals, and also attended meetings with several neighborhood groups.

Route 755 has been in the planning, conceptual, and preliminary design mode since the mid 1950's. During that time there were long periods of inactivity, but through the years the design has been reviewed, modified, and analyzed many times. Therefore, it is understandable that this Study will not recommend major changes or revisions to the proposed facility, but only minor modifications to improve traffic flow and lessen adverse neighborhood impacts.

Booker's assignment, to analyze selected engineering and environmental factors, was divided into two phases. Phase I was to determine if proposed Route 755 is to provide an efficient, high-speed traffic link between I-55, I-44 and U.S. 40 on the south and I-70 on the north or act as a feeder arterial system to distribute traffic that it collects from Highways 55, 44, 40 and 70 into and out of the City's core area. Phase II was to review MSHD's Strip Map and Revised Draft Environmental Impact Statement (DEIS) and prepare a written report describing the analyses and presenting recommended changes, where applicable, for the following specific items:

- A. Review the proposed design of Cole Street interchange; to determine if it could be simplified and/or improved while still providing the same traffic movements.
- B. Review the design of the entire facility with respect to the number and location of ramps to determine if an alternative

layout or layouts can simplify or improve the proposed system, especially as related to the urban neighborhoods.

- C. Analyze the proposed strip map with respect to the ramp designs as related to merging and weaving distances and other geometric considerations.
- D. Analyze a number of specific areas with respect to noise impacts and specific solutions to mitigate said impacts. Various systems will be analyzed as to effectiveness, attractiveness, and compatibility with the respective urban neighborhoods.
- E. Evaluate the proposed use of Dolman Street as a part of the overall facility right-of-way requirements and effects on areas available for off-street parking for Malcolm Bliss Hospital.
- F. Review and evaluate the proposed access to Route 755 in the Chouteau Avenue and Park Avenue area to determine if a more desirable solution is possible, taking into consideration impacts on the Clinton-Peabody Housing, Clinton School, and other factors affecting the neighborhood.
- G. Evaluate the entire project for possible alternative typical sections, different methods of handling the outer roadways, and location of proposed fencing. This will be done within the framework that a limited access, expressway type facility has been proposed and that concept accepted.
- H. Analyze the entire proposed facility in terms of urban design and landscape techniques to ensure aesthetic values inherent in the existing neighborhood will be incorporated in the project and also to minimize adverse impacts on adjacent residential areas.
- I. Review the additional data collected by the City and MSHD regarding the impacts of the proposed facility on existing neighborhoods regarding displacement and relocation of housing and businesses, and disruption of established neighborhood institutions and social patterns.

General Summary

GENERAL SUMMARY

Route 755 will serve multi purposes--as a limited access freeway, and as a distributor providing local access to adjacent areas via City arterials and residential streets. Route 755 capacity has been designed to accommodate the projected volumes of traffic expected to use the facility to the year 2000.

Five principal industrial areas will experience significant benefits from the distributor function. These are the Pruitt-Igoe Industrial Area, Cass Industrial Area, Franklin Industrial Area, North Riverfront Port Area and Central Industrial Corridor. The connecting aspect of the Route will facilitate truck movements as well as remove truck traffic from arterial and local streets. Relocation of industries presently in residential neighborhoods into these industrial areas will coincide with development of Route 755 and will be a significant benefit to these neighborhoods.

A one-way outer road system paralleling the Route will provide access to City streets and integrate the connecting and distributing functions. To improve access, reduce outer roadway traffic and balance traffic distribution on east-west streets, the study recommends two changes in ramp locations. One would relocate the U.S. Route 40 northbound off-ramp from Olive Street to Market Street to take advantage of Market Street's greater carrying capacity and enhance redevelopment in the southern part of the Central Business District. The other change would add a new northbound on-ramp to Route 755's median at Olive Street to allow access from the central and southern portions of the Central Business District and to reduce traffic on the east outer roadway to Cole Street. The elimination of Dolman and cul-de-sacing of Eighteenth Street will significantly reduce impacts on the Lafayette Square area and the adjacent public institutions.

Aesthetic and noise impacts will be mitigated in various ways depending on the land uses of adjacent areas. For instance, where the adjacent use is residential, combinations of earth berms, brick walls and extensive vegetative plantings are recommended. Where adjacent use is industrial, only random vegetative planting may be needed. Public participation, in accordance with Federal regulations will help determine the location, nature, and type of noise mitigation measures used.

On the whole, Route 755 will result in many positive impacts on adjacent residential neighborhoods. Increased accessibility will greatly enhance the locational attractiveness of these areas. The City will be able to focus community redevelopment efforts by eliminating much of the blighted, deteriorated and vacant housing stock within the Route's right-of-way. New commercial land uses can also be focused at the Route's access points.

Route 755 will generate increased demand for commercial and light industrial uses at access and egress points resulting in considerable

neighborhood revitalization. Truck parking and movement on residential streets will be controlled in the City's redevelopment efforts currently underway.

Substantially lower numbers of families and individuals expected to be displaced were found at this time as opposed to the numbers cited in the Missouri State Highway Department's Draft Environmental Impact Statement. This would mean lower relocation costs and less socio-economic impact on affected neighborhoods.

In order to re-emphasize and strengthen the residential focus of neighborhoods where significant positive changes are underway, several specific procedures are recommended. These include establishing and enforcing zoning regulations which protect residential areas, establishing and enforcing traffic regulations restricting commercial traffic on residential streets, expanding the Cass Industrial Area boundaries to recognize the actual land uses to the north, preparing master plans for the Cass and Pruitt-Igoe sites which invite citizen participation, preparing a Comprehensive Redevelopment Plan taking Route 755 into consideration and capitalizing on its existence, and selecting urban design alternatives to protect and enhance neighborhoods. Several of these recommendations have already been acted upon by key city agencies.

Several schools may be affected by Route 755, however lack of information about student travel patterns makes the actual situation difficult to assess. When the St. Louis Board of Education finalizes district boundaries and is able to determine travel patterns, location of crossings should be re-evaluated.

A number of unique or "non-routine" design alternatives were examined with the key objective being preservation of the urban fabric. Of these, the Limited Cap Alternative appeared to offer the most benefit to the City and to the neighborhoods and therefore, is presented in greater detail.

Order of magnitude costs were prepared for each alternative and include additional structures, all noise abatement features and roadways. The estimates are in 1979 dollars and do not reflect excavation, landscaping and engineering.

Conclusions & Recommendations

CONCLUSIONS AND RECOMMENDATIONS

PHASE I

Through discussions with MSHD and the City, the role of Route 755 was determined to provide a multi-function facility, a limited access urban freeway and a distributor providing local access to and from adjacent areas. A one-way outer road system parallels the freeway lanes providing access and a distributor function to the existing City arterial system as well as residential streets. Specific neighborhood areas, for example Lafayette Square, will receive substantial benefits from reduced traffic intrusion.

An attempt was made to provide an engineering analysis of both functions but sufficient data are not available for such an evaluation. However, preliminary study of the facility's capacity and projected traffic indicates that Route 755 was designed to accommodate the volumes of vehicles anticipated to use the facility.

A socio-economic/environmental analysis identified five (5) principal industrial areas which will experience significant benefits from the proposed facility's distributor function: Pruitt-Igoe Industrial Area, Cass Industrial Area, Franklin Industrial Area, North Riverfront Port Area, and Central Industrial Corridor. Construction of Route 755 is essential as it provides a vital link to the interstate system, facilitating truck movements and removing truck traffic from the arterial and residential street systems.

PHASE II

Engineering Alternatives

Cole Street Analysis

Several major interchange types (full cloverleaf, partial cloverleaf, diamond, and folded diamond, and the proposed MSHD design) were examined to determine their efficiency and safety in accommodating traffic movements at the proposed Cole Street interchange. All of these interchanges, with the exception of MSHD's proposed design, were rejected as being incapable of handling the traffic flow, or too complex in terms of signalization, or because of the large amounts of land required. The MSHD interchange was further analyzed and found to meet all requirements.

Ramp Analysis

The review of the entire facility with respect to the overall ramp/outer roadway system resulted in several major recommendations in the southern terminus, described in the following section, and two important changes in the facility's central portion, described here.

1. Relocate the northbound off-ramp from U.S. Route 40 from Olive Street to Market Street in recognition of Market Street's

greater overall traffic carrying capacity and the extensive redevelopment in the southern part of the CBD.

2. Add a new northbound on-ramp to the median of Route 755 at Olive Street, providing access to the proposed facility from the central and southern portions of the CBD, reducing traffic flow and demand on the east outer roadway to Cole Street.

These recommendations will provide improved access, reduced outer roadway traffic volume, and balanced traffic distribution on east-west streets.

Southern Terminus Analyses

Ramp Design

The following design changes are recommended to alleviate adverse impacts on City Hospital, Harris Row, Malcolm Bliss Hospital, Clinton School, and Clinton-Peabody Housing, and to provide the Chouteau area with direct access to Route 755. First, relocate the northbound on-ramp and southbound off-ramp at Park Avenue south to Lafayette Avenue. This recommendation reduces neighborhood impacts on Park Avenue in general and the sensitive institutions and housing in particular, routing traffic to Lafayette Avenue which has greater capacity to handle the proposed traffic volume.

Second, move the northbound off- southbound on-ramps to the north side of Chouteau Avenue to provide the Chouteau area with direct access/egress to Route 755 and eliminate the need for traffic generated by adjacent industrial/commercial land use to use neighborhood streets. Additionally, this change eliminates the need for relocating Dolman Street, thus reducing adverse impacts on Harris Row.

Grade Changes

A preliminary analysis was made to determine the feasibility of revising the southern terminus of Route 755 with I-44 and I-55 from an elevated to a depressed section. The study indicated this modification was possible through increased costs associated with safety problems of existing traffic intermixed with construction activities, movement of excess earth materials, and demolition/construction. Any decision revising this section of the facility must involve trade-offs concerning of adverse socio-economic, noise, and aesthetic impacts against monetary and safety costs/benefits.

Review of Typical Sections

The evaluation of typical sections and outer roadway locations indicated that no changes were needed in the typical sections or in the location and handling of the parallel outer roadways except as noted above and in providing three pedestrian crossings to facilitate neighborhood

travel patterns. These crossings are located at Howard, Warren, and Hebert Streets as shown on Plate V.

Parkway Alternative

At the request of the City, an analysis was made of a major modification in Route 755: construction of the northern portion (from Cole Street to I-70) as an at-grade, parkway-type facility, with four intersecting streets; Cass Avenue, North Market Street, St. Louis Avenue, and North Florissant Avenue. Study of average daily traffic, peak hour volumes, and capacity revealed that the minimum number of lanes required would be five in each direction, with six lanes providing better traffic flow. The median would range from sixteen feet to thirty feet to accommodate the required left turn lanes.

PHASE II

Environmental Impacts

Urban Aesthetics

Analysis of aesthetic and noise impacts generated by Route 755 revealed several areas adjacent to the facility which will require significant mitigation measures. Specific areas and recommended treatments are:

1. Lafayette Avenue to Chouteau Avenue: combinations of earth berms, brick walls, vegetative plantings, and elimination of relocated Dolman Street.
2. Chouteau Avenue to Cole Street: random vegetative planting only.
3. Cole Street to North Florissant Avenue: earth berms and plantings.
4. North Florissant Avenue to I-70: combination of earth berms, brick and textured concrete walls, and dense vegetative plantings.

The use of walls or noise barriers is recommended in the sensitive residential neighborhoods to prevent or moderate adverse visual and noise impacts. It is recommended that residents of the impacted areas participate in the location, nature, and type of noise mitigation measures as they are directly affected by them. It is further recommended that MSHD investigate noise absorptive qualities, cost, and maintenance characteristics of walls and plantings to determine the most economical and effective solutions to mitigation of noise and visual impacts.

Neighborhood Impacts

Several impacts generated by the proposed facility will affect adjacent neighborhoods, including increased traffic and noise on St. Louis Avenue, Lafayette Avenue, Chouteau Avenue, Market Street, and Cole Street. St. Louis Avenue may be particularly affected by increased volumes of truck traffic. A number of treatments were studied. The best solution may be to restrict parking and open all four lanes on St. Louis Avenue to traffic movement. Another significant neighborhood problem concerns the visual and noise problems generated by the elevated section of Route 755 south of Park Avenue, directly affecting City Hospital, Malcolm Bliss Hospital, and Clinton School. Serious consideration should be given to redesigning this southern terminus from an elevated to a depressed section.

Construction of Route 755 will also result in many positive impacts on adjacent residential neighborhoods. Specifically, the facility will greatly enhance the locational attractiveness of these areas through increased accessibility. It will enable the City to focus its community redevelopment efforts within the Route 755 right-of-way. In addition, it will focus new commercial land use at access points to Route 755.

Land Use

The proposed facility will generate increased demand for commercial and light industrial uses at access and egress points resulting in considerable neighborhood revitalization. Some of these changes may occur at the expense of residential land use and must be controlled carefully. In particular, the intrusion of truck parking and movements on local neighborhood streets is a major adverse impact on residential land use and values and must not be allowed to increase because of Route 755. Community development activities currently underway and planned (i.e., Desoto-Carr, Pruitt-Igoe, Neighborhood Strategy Areas, Columbus Square, Franklin Industrial...) should, on the other hand, decrease current intrusion levels in residential areas, and the integration of Route 755 with these plans can reinforce this positive impact.

Housing

Re-analysis of population relocations necessitated by construction of the proposed facility has determined that only 970 individuals and 371 families will be affected and not the 2016 and 576 respectively as initially determined in the DEIS. These numbers are substantially lower than the DEIS data indicating lower relocation costs and lessened socio-economic impacts on the affected neighborhoods.

Significant changes to the housing stock in many neighborhoods adjacent to Route 755 are currently underway, especially in Murphy-Blair. Programs combining federal, state, city, and private funds are currently being prepared, offering more than four hundred new and rehabilitated residential units to families and elderly.

In order to re-emphasize the residential focus of Montgomery, Murphy-Blair, and other neighborhoods adjacent to Route 755, several specific procedures are recommended:

1. establish and enforce zoning regulations limiting intrusion of industrial land uses into residential areas;
2. establish and enforce traffic regulations restricting commercial truck use of as well as parking on residential streets;
3. expand the present boundaries of Cass Industrial Area recognizing the actual industrial land uses to the north and northwest and incorporating them into the industrial district;
4. prepare Master Plans for the Cass Industrial Area and the former Pruitt-Igoe site, with a major citizen participation element, ensuring adverse impacts (visual, aesthetic, noise, air, etc.), are buffered appropriately at the edges of the industrial districts;
5. prepare a Comprehensive Redevelopment Plan, considering Route 755 as existing entity, utilizing existing state urban renewal legislation (Land Clearance Redevelopment Act - RSMo 99.300), with a major citizen participation effort, emphasizing existing and potential residential-cultural values and identifying areas for new development, renovation and rehabilitation, in-fill housing, and total redevelopment; and
6. select urban design alternatives which will provide maximum protection and enhancement for the neighborhoods as related to the Comprehensive Development Plan.

Schools

Three high schools (McKinley, Vashon, and Central) and a number of feeder elementary schools are impacted by Route 755 division of their districts. However, the St. Louis Board of Education has no information available concerning student travel patterns between residence and schools. Therefore, it is very difficult to determine precise impacts generated by the proposed facility. Provision for students walking to schools was one of the principal factors in locating of the three pedestrian crossings in Phase II - Engineering Alternatives. When the Board finalizes its districts boundaries and is able to determine travel patterns, the location of the crossings should be re-evaluated.

Clinton School is more directly impacted than any other as it immediately abuts the proposed highway. Several very important impacts will affect students and staff at Clinton and are listed as follows: long-term freeway related traffic generated noise; short-term but highly disruptive highway construction noise; traffic related vibration;

pedestrian safety; air pollution; and long- and short-term fiscal impacts.

Design Alternatives

At the request of the City, several design alternatives for the proposed facility were studied in addition to the changes recommended by Booker in PHASE II-Engineering Alternatives to the design proposed in the DEIS. One concept, the Limited Cap Alternative, is presented in detail in the report as it seems to offer substantial benefits to the City and impacted neighborhoods.

Limited Cap Alternative

A series of eight caps, ranging in size from approximately 65 feet to slightly less than 400 feet, would be developed over the highway at sensitive points. The caps would provide for both passive (sitting areas, landscape plantings, bike and walkways, bus stops, etc.), and active (tot lots, playgrounds, etc.) recreation. The bikeway/walkway, would link the caps together. Areas between the caps would be landscaped and noise abatement treatment provided.

Extensive Cap Alternative

A series of ten caps, each 500 feet in length, would be constructed over the proposed highway. These caps would feature more intensive development and wider variety of activities than proposed in the Limited version. A bikeway/walkway would link the caps together. Areas in between the caps would be landscaped and noise abatement treatments provided.

Tunnel Alternative

Three separate Tunnel Concepts were developed and studied: a super-block concept with a continuous greenbelt and park system on top of the covered highway; a parkway concept with the parallel access roads constructed on top of the covered highway; and a neighborhood preservation concept wherein all existing local and arterial streets would be replaced and reconstructed on top of the covered highway.

Parkway Alternative

A socioeconomic analysis was made of the impacts generated by redesigning Route 755 from Cole Street to I-70 as an at-grade parkway. Although such a change is feasible, it would cause greater adverse impacts on adjacent neighborhoods than the proposed MSHD design. These adverse impacts (pedestrian and vehicular passenger safety, noise, aesthetics, etc.) would be much more difficult to mitigate successfully than the proposed MSHD design or the Booker-modified MSHD design.

Phase I Analyses

Booker Modified Design

The modification suggested by Booker, in PHASE II-Engineering Alternatives, were analyzed in terms of order of magnitude costs. These changes included several ramp modifications as well as noise abatement structures, located from Lafayette to Chouteau Avenues and from Carr to Branch Streets.

Costs

Order of magnitude type costs for the different alternatives, except for the Parkway Alternative, were prepared and are given below. These costs are in 1979 dollars and reflect the structural additions and changes to the DEIS design, including methods of noise abatement. Costs for excavation and engineering are not included. These costs are not necessarily in addition to the costs given in the DEIS as MSHD did not provide any dollar estimates on constructing noise abatement treatments.

<u>Alternative</u>	<u>Million</u>
Limited Cap	\$100
Extensive Cap	\$110
Basic Tunnel	\$135
Booker Modified DEIS (as proposed in this report)	\$ 85

PHASE I ANALYSES

The intent of the initial phase of the project was to re-evaluate the role Route 755 should play in the transportation network of the City of St. Louis. As this evaluation proceeded, Booker staff was able to identify two major disparate transportation functions for the proposed facility with each function having specific design implications.

First, Route 755 could function as an efficient, high-speed freeway connecting I-70 in the north, U.S. 40 in the center, and I-44 and I-55 to the south. To accomplish this function, few, if any, interchanges other than with the above freeways would be provided.

Second, Route 755 could serve the City's arterial system as a feeder and distributor facility. Numerous access points via the outer roadway to local streets would be provided along the length of the freeway. These access points would permit distribution of freeway traffic to and from adjacent areas, the Central Business District (CBD), and outlying and fringe areas north, west, and south of the core.

In order to determine which of these two alternatives should characterize the design and function of the proposed facility, discussions were held with both MSHD and City personnel. The result was to accommodate the philosophies by merging them into one facility that provides a freeway and a distributor ensuring local access to and from the CBD and adjacent commercial-industrial areas. This solution was accomplished through MSHD's provision of a one-way outer road system extending from Market Street on the south to I-70 on the north. Between the outer roadways lies the high-speed connecting freeway with a limited number of interchanges. The outer roadways provide access to intersecting residential streets along the length of Route 755. With this combination, all design philosophies for the facility are merged successfully.

Engineering Analysis

In evaluating the function of Route 755 as a by-pass facility one of the critical questions that must be addressed is the extent to which Route 755 would provide relief for I-70 traffic south of the Route 755 interchange near Salisbury Street. In order to conduct this evaluation, origin and destination data for vehicles using Route 755 that also could use I-70 is required. These data are not available at this time in a form that could be used for evaluation. The East-West Gateway Coordinating Council is presently in the process of updating their data model and will be able to provide a selective link analysis of Route 755 in approximately three months. This analysis will indicate the number of vehicles that would utilize Route 755 as a bypass for I-70 and also the number of vehicles that would enter or leave Route 755 at various ramps south of I-70.

Since this information will not be available for some time, only general comments can be made relative to traffic volumes entering and leaving Route 755 at I-70 and "rule of thumb" capacity guidelines for Route 755 provided.

The strip map and the DEIS furnished by MSHD indicate the year 2000 anticipated traffic volumes on both I-70 and Route 755 at their merger. North of Route 755, I-70 has a projected total average daily traffic volume of 120,200 vehicles while south of Route 755 this volume drops to 70,000 vehicles, a reduction of 50,200 vehicles. All of these vehicles are on Route 755 at least until they reach the North Florissant Avenue ramp. South of this point, traffic from the local streets is mixed with that from I-70 and no determination can be made with respect to which traffic from I-70 remains on Route 755 and what traffic exits to the local street system.

From a general capacity standpoint, a freeway's practical capacity per lane per hour is approximately 1,500 vehicles. More vehicles can be accommodated, however under such conditions, limitations on vehicle maneuverability and speed are experienced. Immediately south of I-70, the MSHD strip map indicates that the highest peak hour volume per lane is approximately 1,200 vehicles, 300 vehicles below the practical capacity of the facility. In fact, only at Chouteau Avenue does the peak hour volume approach the 1,500 vehicles per lane figure as 4,450 vehicles, or 1,480 vehicles per lane, are expected.

Overall, it must be concluded Route 755 was designed to accommodate the volumes of traffic that are anticipated to use the facility. The facility will also accommodate some additional vehicles, but both vehicle speed and maneuverability will be somewhat restricted by these additional volumes.

Environmental Analysis

Proposed Route 755 will provide an important distributor function in support of a number of key industrial/commercial areas along and near its alignment. There are four (4) principal areas which will experience significant benefits with two areas which will also benefit to a lesser degree.

- o Pruitt-Igoe Industrial Area: this area located in the northern half of the highway's alignment is the former site of a major public housing development which was razed. The site is now scheduled for industrial and commercial redevelopment uses.
- o Cass Industrial Area: this area, situated between I-70 and Route 755, is presently the location of a large number of local transfer trucking operations and maintenance facilities for two national bus lines and one regional bus line serving the St. Louis area. The City's Planned Industrial Expansion Authority (PIE) is presently initiating development of a master

plan for this area which envisions significant expansion and centralization of the trucking terminal facilities.

- o Franklin Industrial Park: this area is located near the intersection of Route 755 and Cole Street and is the first of the inner-city areas which PIE has developed. Koken Industries has already purchased land and started construction within this area. PIE currently proposes to extend this industrial park across Route 755 to Jefferson Avenue.
- o North Riverfront Port Area: this elongated industrial area, from the King Memorial Bridge north to Maline Creek, contains diverse light and heavy industries, important transportation functions, warehousing, and limited wholesaling and commercial activities. The potential for redevelopment concentrating on the transportation nexus (water, rail, highway) is extremely high. The City of St. Louis Port Authority is currently directing a major study of this area in which a Master Plan will guide redevelopment efforts.

These four areas would significantly benefit from construction of Route 755 in several ways. First, the facility would provide direct linkage to the interstate network serving the entire metropolitan area. This linkage would be a major improvement over present conditions. Access to these areas (except for the North Riverfront) is adequate only from I-70 from the west and to the west. Access to I-70 eastbound presently requires use of the downtown street network which is already congested during daytime hours. Access to the other major highways and streets must presently be gained through I-70 and/or by threading through the downtown core and the commercial fringe area. Because the majority of land use activities which now occur and/or are planned to occur are industrial in nature, a great portion of the vehicular movements generated are truck-type vehicles. The residential areas presently bordering these sites now experience many problems associated with heavy truck traffic using the local streets for access to the major street and highway network. Route 755, although it will not totally alleviate these movements, will significantly improve the present conditions. In addition, those area streets which must be utilized for access to the highway will permit for the logical prohibition of truck traffic on the rest of the local streets.

Since many of the trucking operations located in the Cass Area are of the "local transfer" type, the distributor function of Route 755 will be a major factor in increasing the efficiency of their cross-town operations, many of which occur in the north/south corridor between Kingshighway and the Mississippi River. With the potential for major expansion of these trucking functions in the Cass Area, construction of Route 755 becomes substantially more significant.

In terms of the redevelopment sites for industrial/commercial uses within these areas, the construction of Route 755 will appreciably enhance

marketability of the land. It is a proven fact that companies seeking new locations for such activities are greatly influenced by a site's highway/major street access. From this standpoint, the Pruitt-Igoe site and Cass Industrial Area are prime locations in the metropolitan area supported by the best highway proximity/access any company could desire. Without Route 755 these properties would be less attractive, but more important, if additional industrial/commercial development does occur the negative impacts on the area street network would be much more pronounced.

For the North Riverfront Area, construction of Route 755 provides outgoing truck traffic an essential link to the existing highway system, and also provides improved access to the area for incoming traffic generated by anticipated industrial users. Without this facility, the North Riverfront redevelopment will be constrained by the traffic difficulties currently experienced on I-70 and the local street system. In all likelihood, if Route 755 is not constructed, redevelopment in this area could be curtailed and would not generate the jobs and economic support so desperately needed by the City.

With the City carefully guiding development in the Route 755 corridor, existing industrial land uses intruding into residential neighborhoods adjacent to the proposed facility can easily be accommodated in these industrial areas to minimize residential disruption.

Two other such areas would derive pronounced benefits from construction of Route 755.

- o Central Industrial Corridor - this area is located near the southern terminus of Route 755. An elongated, industrially diverse enclave, it is generally the area on either side of Chouteau Avenue between 18th Street and Grand Avenue. PIE is presently initiating a Master Plan for this area which contains the City's wholesale florist district plus a number of major heavy and light industries and railroads occupying extensive land areas.
- o Tower Grove/Chouteau Industrial Area - this area is presently an industrial pocket which is situated at the juncture of the two streets from which it takes its name. PIE also has planned industrial redevelopment activities which will occur in this location.

Unlike the northern industrial/commercial areas, these southern areas all have relatively good access to Interstate 44, which provides the needed link to the interstate network. The principal benefit they will gain is the ability to have access to and from the north which is independent of the "bottleneck" at the junction of I-55, I-70, I-44, and U.S. 40 in the riverfront area. Heavy trucks and commercial vehicular traffic which are generated in these industrial/commercial areas (and which will increase with industrial growth and redevelopment) will benefit

heavily from the Route 755 distributor function. As in the case of the northern terminus situation, should Route 755 be constructed, these areas will benefit from an enhanced marketability. However, in this regard, the overall effects would be less significant because access to I-44 is already adequate.

From a traffic standpoint these areas also generate less impacts upon the local neighborhood street network by industrial and commercial related vehicles. This is because in both the Central and Tower Grove/Chouteau sections access to highways and major streets is less dependent on neighborhood thoroughfares and more divorced from Downtown activities and traffic.

With regard to possibilities for transport industry relocation or concentration, the above discussion of key industrial/commercial areas along the Route 755 corridor notes that several areas have a substantial basis in transport related industries. Specifically, these areas are the Cass Industrial Area, the Central Industrial Corridor, and to a lesser degree the Tower Grove/Chouteau Industrial Area. Major transport industry operations have been firmly established in all of these locations. Through comprehensive planning for each of the areas, the impacts on adjacent residential neighborhoods can be mitigated. Consolidation and streamlining of terminal operations in the Cass Industrial Area, supplemented by construction of Route 755, would effectively improve many of the current adverse conditions in the northern route area related to truck and commercial vehicle traffic being funneled through neighborhood streets.

The southern section serving the Central Industrial Corridor and Tower Grove/Chouteau areas would have less beneficial effects since the heavy vehicle traffic does not now need to use the local street network to any significant degree. The transport related industries in these areas are of less total magnitude than in the Cass Area and it would probably not be unrealistic to consider relocation of some of these uses to other areas. However, relocation to the Cass Area would be one of the prime considerations.

In terms of the proposed highway's distributor function, even total relocation of these uses would not lessen their use of the roadway. For example, if the trucking functions of the Cass Area were relocated to the North Broadway/Hall Street trucking area, they would still be heavy users of Route 755 or the principal streets along the corridor should the highway not be built. This is the case as the majority of these trucking operations are of the local transfer type, needing north/south movements through the corridor between Kingshighway and the Mississippi River.

Phase II Analyses

PHASE II Engineering Alternatives

In this element of the project, Booker staff studied specific Route 755 engineering details presented in the DEIS prepared by MSHD. The items examined were those of concern or importance to the City and were stipulated for study in the contract between the City and Booker. Each of these contract items is noted below, corresponding to the same item set out in the INTRODUCTION, and is followed by a discussion of the analysis and the conclusions reached therefrom.

Cole Street Analysis

Contract Item A. Review the design of the Cole Street interchange to determine if it could be simplified and/or improved while still providing the same traffic movements.

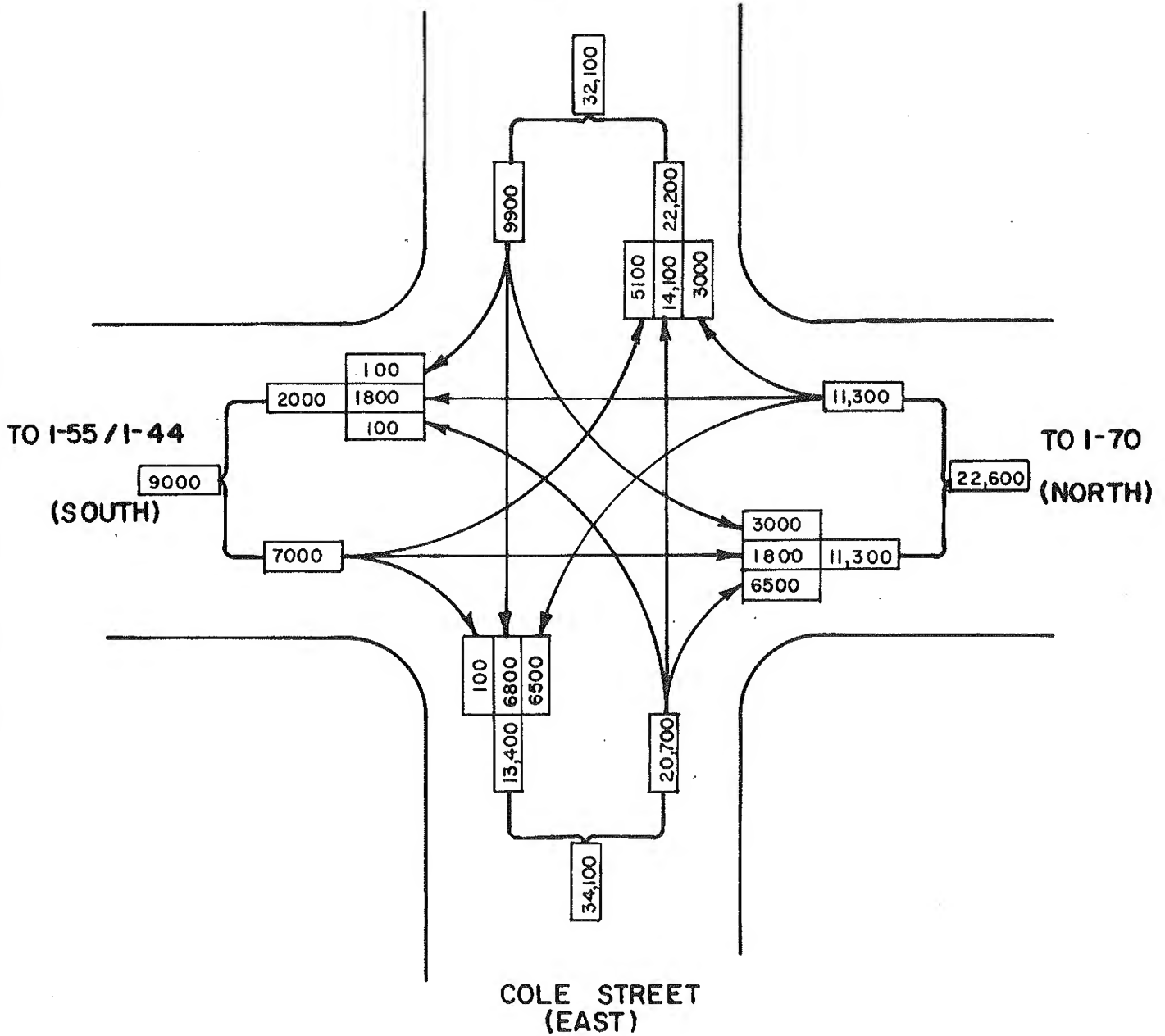
The Cole Street interchange is a vital part of the City transportation system as it is the only full interchange with the City arterial street system (see Figure 1). To the east, Cole Street is a major arterial providing access to the northern part of the CBD in general and the Convention Center and ancillary facilities in particular. To the west, Cole Street will connect with Dr. Martin Luther King Drive and Page Avenue to provide access to the central and western portion of the City. Because of its strategic importance, the Cole Street interchange must function safely and efficiently.

Inspection of the projected traffic volumes for the year 2000 at the Cole Street interchange indicates the traffic on Route 755's north legs (to I-70) is more than two and one half times that of Route 755's south legs (to I-55, I-44). Based on traffic volume alone, the most favorable attention with respect to grades, alignment, and turning movements should be allocated to those motorists using the north legs. Diagram No. 1 depicts the average daily traffic used for design of this interchange.

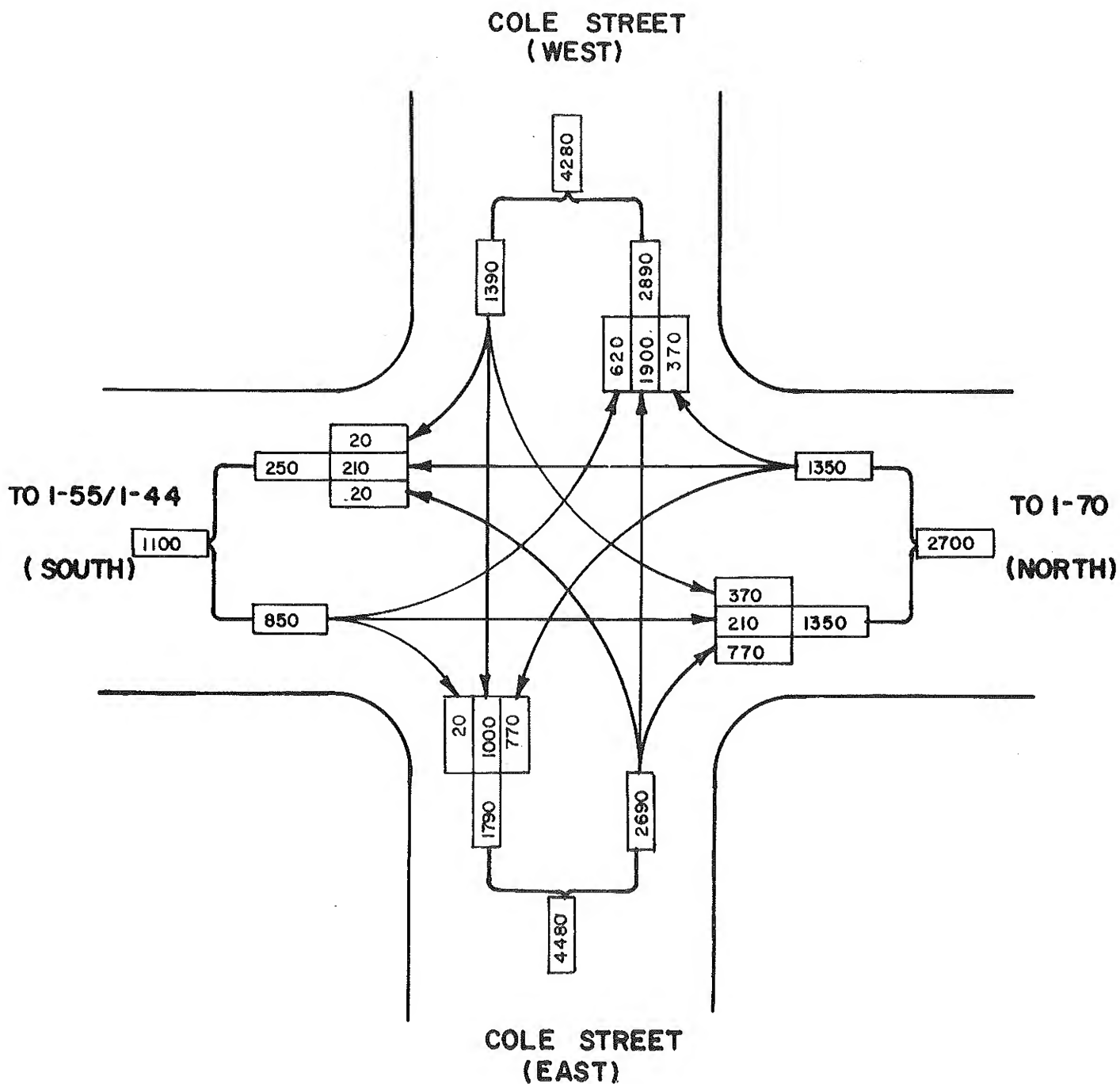
Traffic signal installation, intersection, and turning lane design are based on a certain design hour traffic volume. Diagram No. 2 shows the design hourly volumes for the Cole Street interchange. These volumes indicate that the heaviest traffic demand is on the north legs of the interchange.

Several general interchange types (see Diagram No. 3) were considered to accommodate the traffic movements at the proposed Cole Street interchange. A discussion of the advantages and disadvantages, as related to this particular location, of each type of interchange is presented below.

COLE STREET
(WEST)



AVERAGE DAILY TRAFFIC
TURNING DIAGRAM
(YEAR 2000)

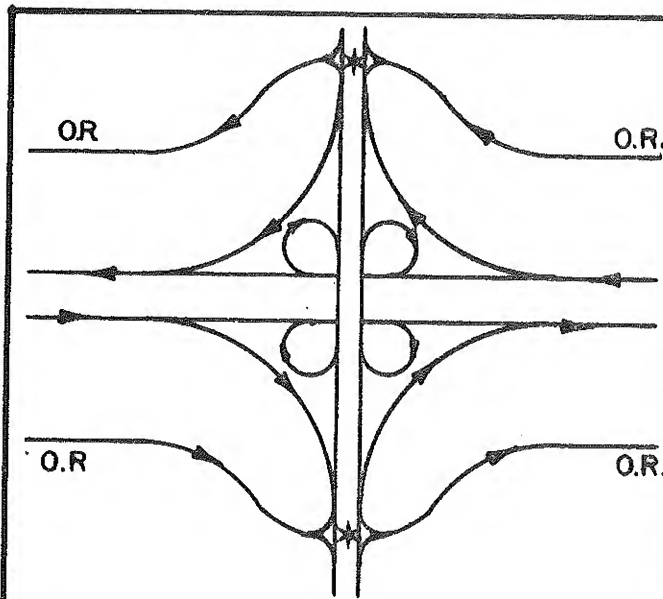


DESIGN HOURLY VOLUME
TURNING DIAGRAM
(YEAR 2000)

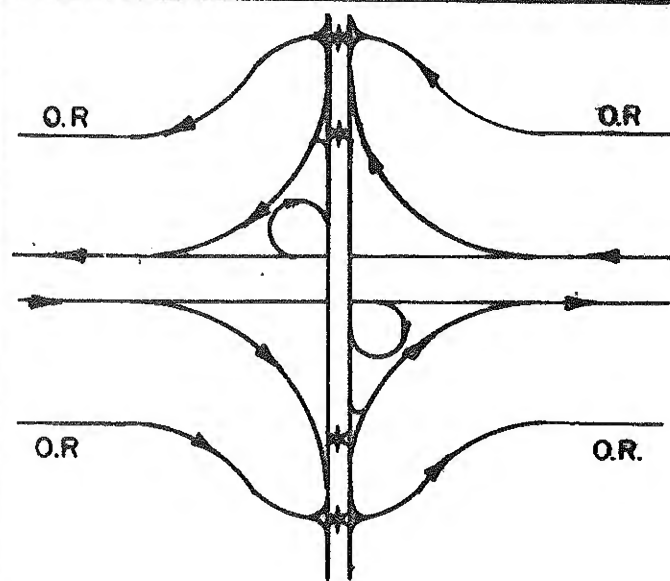
LEGEND

★ _____ SIGNALIZED INTERSECTIONS

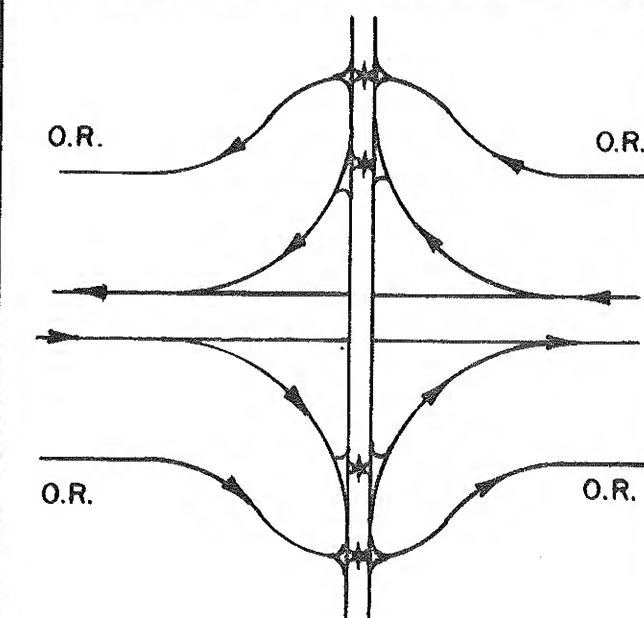
O.R. _____ OUTER ROADWAY



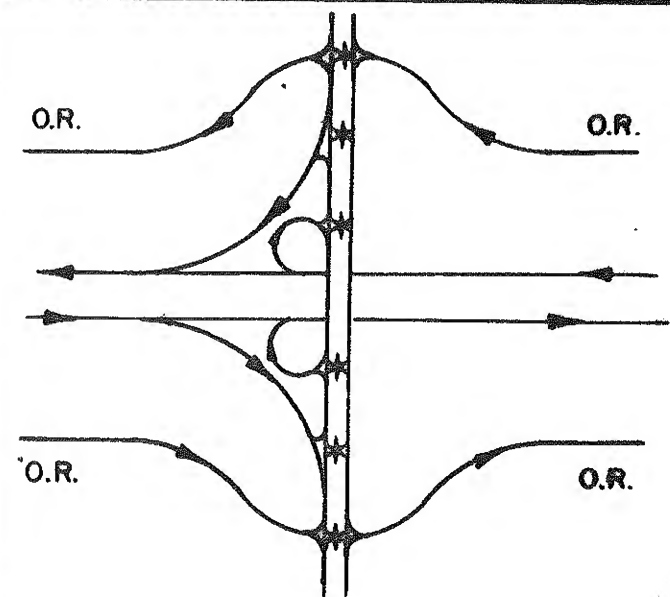
**TYPE A
FULL CLOVERLEAF**



**TYPE B
PARTIAL CLOVERLEAF**



**TYPE C
DIAMOND**



**TYPE D
FOLDED DIAMOND**

GENERAL TYPES OF INTERCHANGES

Type A - Full Cloverleaf

This type of interchange provides the highest level of service for all traffic movements. Within the interchange itself, there are no conflicting traffic movements permitted (conflicts occur where one lane of traffic intersects and crosses another lane). Thus, the only location where traffic signals are necessary to interrupt the flow of traffic and permit another movement is at the intersection of the outer roadways. The design of this type of interchange provides smooth, sweeping curves on the ramps, moderate grades, and sufficient merging and weaving distances to handle large volumes of high speed traffic with minimum stress to the motorists. The full cloverleaf interchange is primarily suited for rural and semi-rural locations due to the large amount of land necessary to provide for the ramps and weaving lanes.

The primary reasons for which the full cloverleaf was rejected as a viable design for the Cole Street interchange are: (1) the vast amount of land required, especially from the George Vaughn Apartment Complex and DeSoto Park, and (2) traffic volumes of certain turning movements do not justify this type of facility.

Type B - Partial Cloverleaf

The partial cloverleaf interchange lends itself to giving favorable attention to specific high volume traffic movements. As indicated in Diagram No. 2, the highest peak hour turning demand is from the north to eastbound Cole Street and also from the south to westbound Cole Street. Separate loop ramps could be provided to accommodate those desires without conflict with Cole Street traffic. Traffic signals are required at the terminus of the remaining two ramps to provide turning movements to the north and the south.

The location of the loop ramp to satisfy the turning desires in the northeast quadrant requires a considerable amount of land which can only be obtained from the George Vaughn apartment complex and DeSoto Park. For this reason, and the operational problems generated by additional signals required at the ramps, the partial cloverleaf at the Cole Street interchange is rejected.

Type C - Diamond

The diamond interchange provides a lower level of service for the required traffic volumes. Traffic flow is interrupted at the terminus of each ramp to permit various turning movements to occur. The diamond interchange was rejected is there is not sufficient storage on either the interchange ramps or on Cole Street to accommodate conflicting traffic movements.

Type D - Folded Diamond

The folded diamond interchange modifies the diamond interchange in that all ramps are placed on the same side of the intersecting roadway. This type is normally used where restrictions are present in close

proximity to one side of an interchange. The folded diamond is not generally desirable since there are additional traffic signals required, lower speeds on loop ramps due to reduced radii, and lack of sufficient storage for vehicles desiring to turn. For those reasons, the folded diamond interchange was rejected.

Proposed MSHD Interchange

Although the Cole Street interchange, as proposed by MSHD provides for all traffic movements between Cole and Route 755, it is a non-standard interchange with movements that may initially confuse motor vehicle operators (see Figure 1).

As proposed, the interchange deviates from the general design concept of most of the freeway because the previously parallel outer roads are merged together on the east side of Route 755. This design ensures that only one signalized intersection is needed to control the complex vehicular movements generated at this interchange. If the service roads had remained "outer" roads, several signals would be necessary to regulate traffic flow instead of one. Additionally, locating the southbound service road along the west side of the freeway would adversely impact vehicular storage on the Cole Street overpass required to accommodate the heavy demand for eastbound Cole Street traffic to turn left to gain access to northbound Route 755. The resulting situation would also adversely impact westbound Cole Street traffic turning left to gain access to southbound Route 755.

The review of possible redesign of this interchange included the possible elimination of the northbound Route 755 off-ramp to Cole Street in the southeast quadrant of the interchange. This loop ramp splits traffic two ways: (1) eastbound on Cole Street, and (2) northbound on the outer roadway and westbound on Cole Street. It was found that no change could be made without either eliminating one of the critical traffic movements or providing an unsafe or below standard situation for particular traffic movements. Specifically, in order to eliminate the loop in the southeast quadrant and simply have an eastbound Cole Street off-ramp, a new loop would be required in the northeast quadrant. However, this alternative would entail intrusion into DeSoto Park and further loss of park land, a solution which was rejected as unacceptable. Therefore, no changes in the design of the interchange as proposed by the Missouri State Highway Department are recommended.

The final portion of the Cole Street interchange to be analyzed was the Level of Service (LOS), or the ability of a roadway to carry traffic, of northbound Route 755 off-ramp at Cole Street. (Levels of Service range from "A", relatively little traffic, to "F", a situation of congestion characterized by forced flow at low speeds wherein the street fails to meet the traffic demand. Level "D" approaches unstable flow with tolerable operating speeds maintained but little freedom to maneuver.) For a short distance, traffic on the ramp would operate at LOS "D" until the ramp divides for eastbound and westbound traffic. However, this LOS

is not unacceptable in an urban setting such as St. Louis, especially considering this condition will be restricted to one specific instance and which only affects a short portion of the ramp.

Ramp Analysis

Contract Item B. Review the design of the entire facility with respect to the number and location of ramps to determine if an alternative layout or layouts can simplify or improve the proposed system, especially as related to the urban neighborhoods.

In assessing this factor, the two principal functions of Route 755 were kept in mind. Although distributing traffic to and from the CBD and commercial-industrial fringe is one of the main purposes of this facility, insufficient access to these areas is provided in the proposed design. The proposed design provides access to adjacent areas and the CBD via a Route 755 northbound off-ramp at Market Street, a northbound off-ramp from eastbound U.S. 40 at Olive Street, and a full interchange at Cole Street. Thus, the only complete Route 755 access point available to the entire CBD and fringe is Cole Street (see Figure 1).

To facilitate review of the entire facility with respect to the overall ramp/outer roadway philosophy, the project was arbitrarily divided into three portions for ease of reference. Access to the southern portion, which extends from Routes I-55 and I-44 on the south to Route 40 on the north, is addressed under Sections 'E' and 'F' elsewhere in this report. The central portion extends from U.S. Route 40 on the south to Cole Street and the northern portion covers the route from Cole Street to I-70.

With respect to the central portion, as proposed by the DEIS, access into the adjacent area and the CBD from I-55 and I-44 is provided by one ramp which exits at Market Street and a second ramp at Cole Street. Traffic from eastbound Route 40 is provided an exit ramp at Olive Street or it may continue to the interchange at Cole Street. Westbound Route 40 is restricted from an exit except at Cole Street. There is no access point in the central portion from I-70 other than the Cole Street interchange.

The egress from adjacent area and the CBD is as limited as its ingress. Except for the Cole Street interchange, egress to I-55 and I-44 is available at Olive Street, access to eastbound and westbound Route 40 is at Olive Street and Market Street respectively, and no access to I-70 is provided at all in the central portion.

To provide improved access and egress, the following recommendations are made. First, relocate the northbound off-ramp from Route 40 from Olive Street to Market Street in recognition of Market Street's greater overall traffic carrying capacity, especially east of Twelfth Street, and of the extensive redevelopment in the southern part of the CBD. This recommended change can be accomplished by bringing the ramp into Market

Street at 22nd Street along side the northbound Route 755 off-ramp. The resulting intersection, although intricate, can be controlled with optically-limited signals with a four-phase cycle: eastbound Market Street with a left turn, east and westbound Market Street, northbound Route 755 ramp, and northbound Route 40 off-ramp (see Plate I).

Second, add a new northbound on-ramp to the median of Route 755 at Olive Street. This ramp will provide access to the proposed facility from the central and southern portions of the CBD and reduce traffic flow and demand on the east outer road to Cole Street.

The advantages these recommendations will provide are: improved access, reduced frontage road traffic loads, and balanced traffic distribution on the east-west streets.

A review of the access points in the northern portion of the facility as proposed indicates one generalized interchange facility. This facility is a modified diamond type interchange with both North Florissant Avenue and St. Louis Avenue as the intersecting roadway. Route 755 southbound off- and northbound on-ramps intersect North Florissant Avenue while the southbound on and northbound off-ramps intersect St. Louis Avenue. A conventional diamond interchange at North Florissant Avenue is not feasible due to the large skew angle of that roadway with Route 755 and still retain St. Louis Avenue as a cross street. Also, the grades of the northbound off-ramp and St. Louis Avenue are not compatible with a full diamond interchange at North Florissant Avenue.

Additional ramps, either for access to or exiting from Route 755, could probably be provided at one of the two remaining cross streets of Cass Avenue or North Market Street, but only at the expense of eliminating an access point at Cole Street or at St. Louis-North Florissant Avenues. The required safe merging and weaving distances are not available with additional ramps. Therefore, it is recommended that no change be made in the location of the ramps as proposed in the northern portion of the facility.

Contract Item C. Analyze the ramp designs as related to merging and weaving distances and other geometric considerations.

This review indicated that there are no difficulties with the ramp design proposed in the DEIS with regard to merging and weaving distances. Sufficient distances were provided in the DEIS design.

Contract Item D. See PHASE II - Environmental Impacts, p. 25ff.

Southern Terminus Analysis

Roadway Design

Contract Item E. Evaluate the proposed use of Dolman Street as a part of the overall facility right-of-way requirements and

overall effect on areas available for off-street parking for Malcolm Bliss Hospital.

Contract Item F. Review and evaluate the proposed access to Route 755 in the Chouteau Avenue and Park Avenue area to determine if a more desirable solution is possible, taking into consideration impacts on the Clinton-Peabody Housing, Clinton School, and other factors affecting the neighborhood.

These two contract items were analyzed together due to their close geographic proximity and interrelation. Any change in ramps at the two above mentioned streets impacts on the use of Dolman Street and the area available for off-street parking for the Hospital.

In the proposed design, no access is provided to Chouteau Avenue or Lafayette Avenue. At Park Avenue there is a southbound off-ramp and a northbound on-ramp; vehicles using these ramps exit and access Route 755 via Dolman and Grattan Streets respectively. This design results in several difficulties: the right-of-way of relocated Dolman Street cuts across a small portion of the Harris Row of the Lafayette Square Historic District; traffic entering Route 755 northward on Grattan Street drives directly past Malcolm Bliss Hospital, Clinton School, and Clinton-Peabody Housing causing adverse safety, noise, and aesthetic impacts; and the Chouteau commercial-industrial area has no direct access to the proposed facility thus requiring truck traffic to use local streets.

In order to resolve these difficulties, the following changes were analyzed. The northbound on-ramp and southbound off-ramp at Park Avenue were assumed to be moved to Lafayette Avenue and a northbound off-ramp and southbound on-ramp were added to Grattan Street and Chouteau Avenue respectively, as shown on Plate II. Included in this proposed design is the eastward movement of relocated Grattan Street between Lafayette and Park Avenues. These changes would improve access and also provide an off-street parking area immediately west of the Malcolm Bliss Hospital entrance between Carroll Street and Park Avenue. This parking area would require a retaining wall for the new northbound on-ramp.

However, further study of these changes and detailed discussions with City and MSHD staff determined that resulting merging and weaving distances at the new on- and off-ramps were very short, 400 feet and 700 feet for northbound and southbound traffic respectively. In addition, approximately 300 feet south of the new off-ramp, southbound traffic would be forced into a major directional decision concerning whether they should continue south via I-55 or west via I-44. Clearly this situation is not conducive to safe and efficient traffic flow.

Consequently, the following changes were analyzed and are recommended. First, retain the above change eliminating the Park Avenue access and egress points and relocating them to Lafayette Avenue. This recommendation reduces neighborhood impacts on Park Avenue in general and

Clinton School in particular and routes traffic to Lafayette Avenue which has greater capacity to handle the proposed traffic volume. Second, move the northbound off- southbound on-ramps to the north side of Chouteau Avenue. The off-ramp would intersect with 18th Street south of Gratiot Street and the southbound on-ramp would intersect Chouteau Avenue at Mississippi Avenue. This recommendation would provide the Chouteau Avenue commercial-industrial area with direct access to Route 755 eliminating the need for traffic generated from this area to use neighborhood streets. Additionally, this change eliminates the need for relocated Dolman Street. Therefore, Dolman Street and its right-of-way infringing on the Lafayette Square Historic District can be eliminated entirely, reducing adverse impacts on the neighborhood as shown on Plate III.

Grade Changes

The southern section profile of Route 755, as proposed by MSHD, begins as an elevated section at the interchange of I-55 and I-44 (see Figure 1). This elevated portion continues northward over Lafayette and Park Avenues, changing to a depressed section at Hickory Street and passing under Chouteau Avenue, then rises to an elevated section over the railroad yards and Route 40. In the vicinity of Park Avenue, the facility passes close to City Hospital, Malcolm Bliss Hospital, and Clinton School.

A preliminary analysis was made to determine the feasibility of revising that portion of the proposed facility from an elevated to a depressed section, as shown in Figures 2 and 3. This analysis indicated that the modifications were capable of being accomplished, although at a cost greatly increased compared to the proposed design. The three major considerations in providing a depressed section in this portion of the facility are the maintenance of existing traffic, earthwork, and construction costs; each of which are addressed in specific detail below.

a) Maintenance of Existing Traffic: By far the most serious and critical element of providing a depressed freeway section of Route 755 at its southern terminus is the safe and efficient handling of existing traffic while reconstruction of the I-55/I-44 interchange is accomplished. Extensive by-passes and detours will be required to effectively re-route existing traffic through and around the construction sites. Maintaining an adequate level of service on any roadway while construction is underway in the immediate vicinity has historically proven to be difficult. In addition to drivers being distracted by construction, there are significant dangers to men and equipment, traffic slow downs, restricted maneuvering space, and many other hazards which could extend through three construction seasons. The stress and tensions that occur while driving in and around a construction area greatly increase the possibility of numerous severe accidents.

b) Earthwork: By depressing the southern terminus of Route 755, the only portion of the facility proposed to be above grade will be that section from north of Chouteau to south of Market Street over the railroad

and Route 40. The remainder of the project will be either at ground level or below grade. The extensive excavation, compounded by the lack of embankment, creates a condition of excess excavated material that must be removed from the project site to a disposal area. A cursory estimate of excess material is in the range of 1.5 million cubic yards. To provide a below grade facility in the southern portion, an estimated additional 0.8 million cubic yards of material would require hauling and the disposal thereof.

c) Construction Costs: To accomplish the objective of providing a depressed freeway at the southern terminus of the facility, a major reconstruction of the Route 755/I-55/I-44 interchange will be required. To obtain the necessary clearances at the overpass structures, to remain within the limits of the maximum grades permitted for through driving lanes and ramps, and conform to the allowable geometric curvature for high traffic volume ramps and through pavements the reconstruction of the various pavements in the interchange are as follows (see Plate IV). First, the existing south-bound Route 755 pavement must be relocated approximately 150 feet to the east and lowered extensively to pass under existing west-bound I-44 and the ramp from north-bound I-55 to west-bound I-44. Second, the proposed ramp from Lafayette Avenue to south-bound Route 755 must pass over the proposed ramp from south-bound Route 755 to west-bound I-44 then pass under existing west-bound I-44. Third, the proposed ramp from east-bound I-44 to north-bound Route 755 will be moved approximately 100 feet to the east. And fourth, the proposed ramp from south-bound Route 755 to west-bound I-44 must be located approximately 100 feet to the east of its proposed location. A preliminary estimate of additional construction costs is in the range of \$17,000,000 to \$19,000,000.

Consequently, in evaluating the feasibility of depressing the southern portion of Route 755, the above costs must be carefully weighed against the adverse socio-economic, noise, and aesthetic impacts experienced by the adjacent neighborhood if that section remains elevated. The decision to be made by the City and MSHD should be based on a detailed analysis of the costs and benefits as specified in the DEIS and this report. Any trade-off should be the result of engineering and planning analyses and the citizen participation process.

Review of Typical Sections

Contract Item G. Evaluate the entire project for possible alternative typical sections, different methods of handling the outer roadways, and location of proposed fencing. This will be done within the framework that a limited access, expressway type facility has been proposed and that concept accepted.

This evaluation indicated that no changes are needed in the typical freeway section or in the location and design of the outer roadways other than those noted in the previous sections. Since the freeway is to

function in both roles as presented on the Phase I discussion, the outer roadways should extend from Market Street on the south to I-70 on the north. Their purpose is not only to provide local access to and from the core area and nearby land uses, but also to provide access for emergency vehicles of all types, especially to adjacent residential areas.

One item of general concern is pedestrian access along that portion of the freeway north of Cole Street. With this in mind, provisions were made for the inclusion of three additional pedestrian crossings. Initially, these crossings were recommended at Howard, Warren, and Hebert Streets, as shown on Plate V. Final location will be made once discussions with the St. Louis School District are completed and the district has finalized the boundaries of the various schools in the area.

A second item of general concern is the large volume of truck traffic that may be generated on St. Louis Avenue west of I-70. The concern is that with construction of Route 755 more trucks will be using St. Louis Avenue, overburdening its two-lane capacity, and disrupting the commercial area between I-70 and North Florissant Avenue and the residential area at St. Louis Place. An attempt was made to resolve this situation, but the lack of data in the DEIS regarding the trucks' origins and destinations and reasons for using St. Louis Avenue prevented the analysis. Should this type of data be available, a further attempt can be made to complete the analysis described above.

One additional item must be noted concerning the northern terminus of Route 755 at I-70 and the McKinley Bridge connection at Salisbury, 9th, and 11th Streets. As presently planned, the westbound off- and eastbound on-ramps to and from I-70 at 9th and 11th Streets will be eliminated. This proposed design will cause Bridge traffic to use 11th Street and relocated Branch Street to gain access to eastbound I-70 at Palm Street and to use the Branch Street exit for westbound I-70 and 9th Street to gain access to the Bridge. Both of these situations will increase not only the distance the motorist must drive, but also adverse noise and safety impacts on adjoining residential areas. It is recommended that the City study methods of using existing arterial streets in this area to provide access for truck traffic to reduce the possibility of use of residential streets.

Parkway Alternative

One suggestion expressed at several of the meetings with City staff was the effects of building the northern portion of Route 755 (from Cole Street north) as an at-grade, parkway-type facility. This facility would be crossed by only four (4) intersecting streets: Cass Avenue, North Market Street, St. Louis Avenue, and North Florissant Avenue. All other city streets would either be terminated at the facility with no access or have only right-turn access.

Daily Volume

Utilizing the strip map provided by MSHD and the traffic volumes presented thereon, a total of almost 75,000 vehicles per day can be

expected on such a parkway-type facility between Cole and North Market Streets. From that point northward to North Florissant Avenue, a total of about 50,000 vehicles per day can be expected. These volumes were obtained by adding the projected Route 755 freeway volumes to those anticipated on the parallel service roads which carry 4,000 of the total daily vehicle volume.

Of the three proposed intersecting streets, the only volumes available are for North Florissant Avenue. At Route 755, daily traffic volumes on North Florissant Avenue are anticipated to be almost 32,000 west of Route 755 and 27,000 east of Route 755. No other cross street volumes are included on the strip map.

Peak Hour Volume

Although daily traffic volumes indicate the overall usage of the facility, peak hour volumes are indicators of the maximum usage during one hour of a typical day. Volumes from the strip map indicate that the flow is southbound in the morning and northbound in the evening. For the service roads, the volumes are equal during both time periods. Total peak hour volume for a.m. southbound and p.m. northbound traffic is 4,150 vehicles.

Lane Capacity

The capacity of any roadway is the sum of the capacity of its lanes. This capacity is measured in Level of Service (LOS) which is a mathematical expression of the ability of the roadway to carry traffic. LOS is expressed by letter designations ranging from "A", free traffic flow, to "F", totally stopped condition. For design purposes, LOS "C" or "D" are used with practical capacity being LOS "E".

Much research has been done relative to determining the capacity of a roadway and its individual lanes. The results of this research have been assembled in various aspects and are summarized in the Transportation and Traffic Engineering Handbook of the Institute of Transportation Engineers. For an urban arterial roadway, such as the one proposed, lane capacities for various LOS are shown in the following table.

Table 1

Lane Volume Capacities for Various Levels of Service

LOS	Lane Volume per Hour	Volume/Capacity
A	300 or less	0.50
B	500	0.83
C	600	1.00
D	675	1.12
E	750	1.25

Utilizing these data, the number of lanes required for a roadway can be determined by dividing the peak hour traffic volume for each direction by the lane volume presented above. The results of this calculation are presented in Table 2 below.

Table 2
Number of Lanes Required for
Various Levels of Service

LOS	Peak Hour Traffic Volume (one direction)	Lane Volume Per Hour	Lanes Required
A	4,150	300	13.8 - 14
B	4,150	500	8.3 - 8
C	4,150	600	6.9 - 7
D	4,150	675	6.1 - 6
E	4,150	750	5.5 - 5

Lane Requirements

As indicated in Table 2, the minimum number of lanes required for the facility would be five in each direction with six lanes providing better traffic flow (see Figures 9 and 10). This calculation does not include any provision for left-turn storage lanes at the four cross street intersections. Based on the strip map volumes, dual left-turn lanes for northbound to westbound vehicles would be required at the North Florissant intersection. Although no volumes are shown on the strip map for the other three cross streets, it is safe to assume that at least a single left-turn lane would be needed in each case.

Street Cross Sections

Based on the above data, the cross section of the proposed facility can be determined. Due to the heavy volumes of traffic, 12 foot lanes should be used for both through and left-turn lanes. Eleven foot wide lanes could be used, but traffic flow would be hindered to some degree. Since the facility will be designated a parkway, a median should be provided for tree planting. In order to accommodate the left-turn lanes plus additional width for separation of traffic flow, this median should be a minimum of 16 foot wide, increasing to approximately 30 feet in the vicinity of North Florissant Avenue to accommodate two left turn lanes.

The above mentioned lane and median requirements are only for traffic flow and do not take into account any on-street parking. Two possibilities exist for such parking: curb lane parking added to the through lanes or a service road concept separated from the through lanes by a planting strip. In the first alternative, a minimum of 10 feet would be needed on each side of the facility to provide for parking at all times. However, parking could be permitted on the facility during all but the morning and evening peak periods without any increase in roadway width. The second alternative would require a service roadway parallel to

the main facility and separated from it by a median, preferably wide enough to provide for tree planting. The facility should be a minimum of 20 feet wide with a separating median of six to ten feet.

PHASE II ENVIRONMENTAL IMPACTS

In this element of the project, Booker staff analysed specific Route 755 environmental data presented in the DEIS. The items examined were those of concern or importance to the City and were stipulated for study in the contract between the City and Booker. Each of these contract items is noted below and is followed by a discussion of the analysis and the conclusions reached therefrom.

Urban Aesthetics

Contract Item D. Analyze a number of specific areas with respect to noise impacts and specific solutions to mitigate said impacts. Various systems will be analyzed as to effectiveness, attractiveness, and compatibility with the respective urban neighborhoods.

Contract Item H. Analyze the entire proposed facility in terms of urban design and landscape techniques to ensure aesthetic values inherent in the existing neighborhood will be incorporated into the project and also to minimize adverse impacts on adjacent residential areas.

These two items are addressed together as they are closely interlinked.

Cities are by definition places where many, varied, and intensive activities are frequented by large numbers of people. Cities are also dense populations of strangers with diverse economic, political, racial, ethnic, and class characteristics working in an almost bewildering multitude of jobs. A very significant key to the efficient functioning of cities is the movement of residents to economic and social functions and movement of goods from one place to another and eventually to the market where they are purchased and moved once again. These extraordinarily important movements are largely accomplished in modern cities by highways and streets.

In planning, location, design, and construction of modern highways not only are economic and engineering factors considered, but also aesthetics must be taken into account so proposed facilities do not destroy or adversely impact (without significant and overriding cause) existing residential and commercial developments.

The DEIS takes a strictly utilitarian approach to the noise problem and does not mention noise abatement measures other than berms and various walls constructed of a number of common building materials. The proposed Aesthetic Plan detailed below takes into account use of vegetative plantings in combination with advanced techniques to mitigate noise and screen the facility from view of adjacent neighborhoods. Aesthetic values

integrating the facility into the existing urban fabric are addressed by use of line, color, form, texture, scale, contrast, seasonal change, and many other visual design principles. The plan distinguishes among the diverse neighborhoods (residential, commercial, industrial, institutional) and tailors noise and aesthetic design measures to these areas. Citizen participation, as required by the federal government, in the provision of adequate noise protection also must be solicited at some point because, although noise barriers are built for protection of residents, the barriers become part of their environment and affect their daily lives. Therefore, the visual appearance of the barrier or the types of changes in scenic view is a very important part of the planning process and must be addressed in the near future.

In order to develop an objective plan incorporating existing aesthetic values in the various neighborhoods traversed by Route 755, a Visual Impact Analysis is presented first, followed by the Aesthetic Plan.

Visual Impact Analysis

The purpose of the visual analysis portion of this study is to evaluate the aesthetic impact of the proposed highway upon adjacent land uses. It will also establish possible alternative methods by which adverse visual impacts of the proposed highway might be minimized.

The methodology used in the development of this visual impact study consists of three parts: 1) inventory and analysis of existing land uses; 2) determination of specific areas in need of aesthetic improvement; and 3) recommendations or methods of improvement that might be employed.

Research and inventory of existing land uses consisted of gathering all available information pertaining to the proposed area of discussion. Photos of surrounding areas were employed to record existing conditions adjacent to the proposed expressway. In addition, numerous site visits were made in order to obtain increased perception of the overall visual impact of Route 755 not only from directly adjacent areas but also from areas within a quarter mile on either side of the proposed highway. Views of commuters from the expressway were also taken into consideration in this analysis.

The analysis includes subjective and objective evaluation of all areas concerned, with the intent of ranking these areas in terms of needs for visual buffering. Commercial areas were designated as requiring the least amount of visual screening, while residential areas overlooking the depressed portions of the highway would require maximum screening.

Determination of the specific areas in need of aesthetic enhancement and appropriate improvement methods was the end result of the research, inventory, and analysis phases. The plans and typical sections below were developed as a means of communicating the culmination of these phases.

Aesthetic Plan

In this analysis, the proposed facility is divided into four sections: southern terminus (I-44 to Chouteau Avenue); south central (Chouteau Avenue to Cole Street); north central (Cole Street to North Florissant Avenue); and northern terminus (North Florissant Avenue to I-70). In the narrative on each section below, the facility will be described, neighborhood characteristics noted, specific noise-visual problems evaluated, and various solutions presented (see Figures 4, 5, and 6).

Southern Terminus Section

At Route 755's southern terminus with I-44 and I-55, it is an elevated facility while north of Park Avenue it is depressed under Chouteau Avenue. The adjacent neighborhood consists of mixed uses with residential predominating. On the eastern side of the highway the residential use is the Clinton-Peabody Housing development, a low-rise family oriented project; east of Clinton-Peabody in the high-rise Dorst-Webbe Housing development. On the west side are single and multiple-family dwellings in the Lafayette Square Historic District, largely two and occasionally three story units. Commercial developments are found on Lafayette, Park, and Chouteau Avenues. Institutional uses are located on Grattan Street, particularly City Hospital, Malcolm Bliss Hospital, and Clinton School.

A number of serious noise and aesthetic problems are generated that present difficulties in abatement by the elevated nature of the facility, including the multiple-story institutional and residential units, and the closeness of the Historic District. A typical combination of earth berms, walls, and vegetative plantings (see Section 2) will be partially successful in mitigating noise and visual impacts at grade level but will not moderate those impacts on nearby receptors above the elevated facility, notably the three adjacent institutions on Grattan Street. However, elimination of relocated Dolman Street (see Figure 2) and dead-ending Eighteenth Street will result in fewer noise, vibration, and visual impacts on the Historic District in general and on the unique Harris Row and Clinton-Peabody Housing in particular. In order to preserve the historic character of the Lafayette Area, the sound walls proposed are of used brick commonly found in St. Louis, and are of curvilinear design to provide visual and aesthetic variety. Sound walls are also proposed to protect the residents of the Clinton-Peabody Housing development from adverse noise impacts. Vegetative plantings along the wall will provide a variety of color and form, integrating the treatments into the neighborhood.

South Central Section

From Chouteau Avenue to Cole Street, Route 755 will be depressed under Chouteau Avenue, elevated over the railroad yards and Route 40, then depressed to Cole Street. From Chouteau Avenue to Route 40 there are no

parallel roads, but from Route 40 to Cole Street such a system is proposed.

In general, the south central section consists of industrial and commercial land uses, ranging from heavy industrial to business trade and financial institutions. Residential uses are extremely limited. North of Washington Avenue many of the buildings have suffered extensively in recent fires and are largely abandoned or underutilized.

In terms of aesthetic treatment, this section presents few if any difficulties. Grassy slopes and scattered vegetative plantings are sufficient techniques to adequately integrate the facility into the adjacent area and buffer any negative impacts (see Section 1).

North Central Section

From Cole Street to North Florissant Avenue, Route 755 is a depressed facility with parallel one-way roads on both sides. There is a major interchange at Cole Street and half-diamond interchange at St. Louis Avenue.

The neighborhood transected by the proposed facility varies somewhat but is largely residential in nature. From Cole Street north to Carr Street the major land uses are commercial-industrial with a considerable number of vacant parcels and abandoned buildings. Between Carr Street and Cass Avenue, the highway passes through DeSoto Park and abuts the DeSoto Community Center, St. Stanislaus Church, and the site of the former Pruitt-Igoe Housing Project. North of Cass Avenue, the neighborhood is predominately residential, intermixed with light industrial and transportation-oriented uses. Most of the residences are two-story units, many of which are in need of repair or renovation. These units are frequently separated by vacant lots formerly occupied by houses.

Aesthetic treatment for this section varies from little to extensive. In the vicinity of Cole Street, few abatement measures are necessary due to the commercial-industrial nature of adjacent land (see Section 3). However, from Carr to Cass Streets, DeSoto Park, DeSoto Community Center, and St. Stanislaus Church are uses sensitive to noise-visual impacts which should be buffered by berms and vegetative plantings, especially on the east side of the proposed facility. From Cass Avenue to North Market Street, the mixed residential and industrial uses should also be buffered from highway impacts by earthen berms and plantings. The last segment of the section, North Market Street to North Florissant Avenue, because of its dominant residential character, high potential for redevelopment, and nearness to St. Louis Place and other sensitive receptors should be accorded well-developed aesthetic treatment including combinations of berms, sound, walls, and dense plantings on both sides of the berms in order to mitigate adverse impacts of the facility on the neighborhood (see Section 4).

Northern Terminus Section

Route 755, at its northern terminus with I-70, is depressed under North Florissant Avenue and I-70, and bounded by a parallel road system. Branch Street is displaced slightly south of its present location. The only access to the facility in this section is from I-70.

The neighborhood consists largely of two-story single- and multiple-family residential units near North Florissant Avenue and mixed residential and industrial in the vicinity of I-70. From the exterior, the residences in general appear to be in sound condition with some units needing repair or renovation. There are few abandoned structures and vacant lots.

Of all the neighborhoods traversed by Route 755, the population is most dense in the northern terminus section. Additionally, considerable residential renaissance and renovation is in evidence. Consequently, to preserve and enhance these strong residential values, it is recommended that combinations of sound walls, berms, and dense landscape plantings be incorporated into design of Route 755 in this section (see Section 4).

In this northern section, it is recommended that the City study various methods of mitigating the noise, dust, and aesthetic problems associated with the area around Branch Street and I-70 to make certain the proposed Route 755 terminus with this area does not generate additional impacts.

Screen Wall Designs

Highway screen walls or noise barriers tend to appear very dominant and often out of place in the environment due to their size and "design" characteristics. Often these walls are eight or more feet high and may extend for thousands of feet along the right-of-way, directly impacting the neighborhood abutting the facility.

The form a barrier takes is an important design feature. Long straight structures are monotonous and cause the wall to appear longer than it actually is. This type of wall adversely affects both drivers and highway neighbors. High walls adjacent to a highway or near a residence tend to create a feeling of forced enclosure thus causing anxiety or discomfort in the viewer. Negative attitudes about the wall develop especially if the wall is aesthetically unappealing.

Since screen walls are usually long and predominately horizontal, alternatives should be considered that reduce the visual monotony caused by this situation (see Figure 5-A). One such alternative might be the introduction of vertical lines or elements to help reduce the perceived length of the wall (see Figure 4-A). Planting can be one effective means of de-emphasizing the perceived horizontal dominance of a wall (see Figure 6-A). Another alternative is to form the walls in a zig-zag or accordion effect, a treatment which prevents noise build-up and is visually interesting (see Figure 4-B).

Another of means achieving vertical lines and reducing monotony might be to vary the shape of the wall in a plan view. A series of jogs in a wall (castellated wall) serve to reduce the straight line effect and create pockets for planting (see Figure 5-B). The breaks may be used as transition points for changes in color, texture, and/or wall height. These breaks may also contain acoustical material to absorb noise from the highway.

A third method of developing vertical elements on a long wall is the introduction of pilasters which would serve a dual purpose: to provide horizontal relief and serve as structural support (see Figure 4-A).

An innovative approach that is structurally sound, visually pleasing, and acoustically effective is the use of acoustical panels at right angles to the highway and to the supporting serpentine concrete retaining walls (see Figure 6-B). This treatment absorbs considerable noise and is particularly effective in noise sensitive areas.

Sound walls may also be constructed of a variety of materials to provide noise mitigation and also aesthetic variety. Concrete can be constructed in a variety of shapes, textures, and even colors. Wood walls can also be given any number of treatments to vary their appearance. And brick and stone can be used to provide interesting details and integrate walls into specific neighborhoods.

Length is not the only negative impact of most noise barriers; height, as mentioned before, can also cause adverse effects. Various methods might be employed to offset the perceptual height of a wall. For example, berms may be used in conjunction with a wall or walls to break up the undesirable line of the wall and reduce the apparent height (see Figure 6-A). The straight line effect may also be reduced by varying the height of the berm in relation to a constant wall height.

Another effective means of reducing the visual impacts of a high wall is through use of multiple walls arranged in tiers (see Section 4). This has the effect of reducing the perceived height of the wall as well as minimizing the constricted feeling of enclosure created by a tall vertical wall adjacent to the road or residence. This type of wall also provides space for planting which helps to break up the predominately linear appearance of a straight wall.

Plantings are by far the most effective, economical means available to reduce adverse visual impacts of a screen wall (see Figures 5-B and 6-B). When used in combination with screening structures, plants serve as a visual tie between the structure and the landscape. Plants help to reduce the massive scale of high walls and balance their proportions. Plants also provide visual interest to both mobile and stationary observers. But the most important function provided by plants is that people can relate to them in what otherwise may be a sterile man-made environment.

Recommendations

The Aesthetic Plan uses combinations of various types of barriers to achieve the desired height and buffering effects in the diverse neighborhoods adjacent to proposed Route 755. Earthen berms, landscape plantings, and sound walls constructed of a variety of materials are recommended to achieve reduction of adverse noise and visual impacts. Plants are intended to reduce direct and reflected noise impacts and also are the most effective, economical means available to relieve adverse visual impacts associated with highways when viewed from adjacent residential neighborhoods.

The Missouri State Highway Department should investigate carefully noise absorptive qualities, cost, and maintenance characteristics of various sound walls (concrete, metal, wood, stone, brick, etc.) and planting materials to determine the most economical and effective solutions to mitigation of noise and visual impacts generated by the proposed facility. Citizen participation, as required by federal regulations, is a key element in the location, nature, and type of noise mitigation measures.

Neighborhood Impacts

Contract Item I. Review the additional data collected by the City and MSHD regarding impacts of the proposed facility on existing neighborhoods regarding displacement and relocation of housing and businesses, and disruption of established neighborhood institutions and social patterns.

Highways in general generate many types of impacts on surrounding land. Urban highways constructed through existing residential and commercial neighborhoods produce positive and negative impacts on the physical environment, residents and visitors, and commuters that are likely to be highly controversial in nature. The following material carefully considers the multitude of neighborhood impacts of the proposed facility.

The population of the areas traversed by the facility is mostly lower income with a significant number of aged individuals. Populations with these characteristics generally have reduced access to automobiles and walk to commercial and social foci in the neighborhoods in question. The proposed facility may create hardships for a portion of the people living in areas adjacent to it by isolating uses on opposite sides of the facility. This isolation, which may be more perceived than real, will affect neighborhood travel behavior, particularly shopping, church, and socializing trips. These impacts can be mitigated in the northern portion of the facility by construction of several pedestrian overpasses at key points, especially between North Florissant Avenue and I-70, St. Louis

Avenue and North Market Street, and North Market Street and Cass Avenue as shown on Plate V.

Additional traffic impacts on adjacent neighborhoods may occur but because no data on 1980 or 2000 traffic volumes (with or without Route 755) are provided in the DEIS for St. Louis Avenue, Cole Street, Market/Olive Street, Chouteau Avenue, Lafayette Avenue or other east-west arteries these effects are very difficult to assess. These streets are important as Route 755 access and egress routes. The DEIS also does not address noise impacts in areas adjacent to these streets caused by automobiles and especially trucks travelling to and from Route 755. St. Louis Avenue would appear likely to be impacted east of North Florissant Avenue, where it is only two lanes wide and already congested due to its serving as one of the few streets providing access to the 14th Street Mall and industrial areas east of I-70. Additional truck and auto traffic on St. Louis Avenue, headed for or exiting from Route 755, may exacerbate this situation but the exact effects cannot be determined at this time. Booker planning and engineering staff have studied a number of alternatives to alleviate this problem, including closing St. Louis Avenue at Eleventh Street and rerouting traffic, and widening St. Louis Avenue. However, the problems caused by these solutions, diffusion of traffic onto other neighborhood streets, disruption of vehicular traffic, and destruction of commercial and residential properties are of even greater magnitude than the problems generated by the projected increase in traffic on St. Louis Avenue.

It is recommended that the City study this problem in detail by identifying the possible alternatives and the specific impacts associated with each solution during the design phase of Route 755.

Another specific neighborhood impact concerns the elevated nature of the facility south of Park Avenue. This design causes adverse noise effects on three public institutions extremely sensitive to such impacts: City Hospital, Malcolm Bliss Hospital, and Clinton School. Due to the elevated nature of the facility and the multiple-story institutional structures, typical noise attenuation measures may not provide the necessary abatement. As a detailed example, the Noise Impact section of the DEIS chapter, "The Probable Impact of the Proposed Action on the Environment," indicates that Clinton School will record 79 dBa at L₁₀ (the noise level exceeded 10% of the time under consideration), or a level exceeding that recommended by the Federal Highway Administration for Land Use Category "B", constituting a serious impact, one that must be mitigated carefully. Additional noise impacts will occur at other areas along the facility, but these impacts will be mitigated as detailed above in the section on "Urban Aesthetics". Serious consideration should be given to redesigning the southern terminus from an elevated to a depressed section. This solution would be costly but would certainly result in far less adverse visual and noise impacts on this very sensitive area.

In some areas of the corridor, numerous vacant lots, abandoned buildings, and structures in varying need of repair ranging from general maintenance

to total renovation are mixed with some sound units. The freeway will stimulate already rising interest of City residents in renovation of existing residential units and will also encourage in-fill housing. The facility may well prove to be the impetus needed to help neighborhoods "turn the corner" and find their way back to former positions of prominence within the City.

The proposed facility will provide many benefits for residents, property owners, and businessmen in the neighborhood around the southern terminus with I-44. The facility will provide several locationally significant advantages by increasing access to the regional transportation system and egress to the neighborhood. The facility will also relieve traffic on the neighborhood streets by distributing commuters accessing the CBD northward to U.S. 40, Market Street, and Cole Street. Thus, by relieving traffic congestion and increasing access to the area, Lafayette Square residents and businessmen should benefit significantly. By eliminating Dolman Street, many adverse impacts are lessened significantly, and retaining the cul-de-sac on Eighteenth Street will have similar benefits to the neighborhood. A significant beneficial impact to the Lafayette Square area will be diminution and possibly even elimination of industrial traffic from residential streets. The noise, dust, and pollutants associated with truck traffic will also be significantly reduced.

Similarly, Route 755 will benefit the commercial-industrial area from Chouteau Avenue to Carr Street by providing increased access to the neighborhood and region. Thus, the facility makes the neighborhood more attractive as a business location serving the CBD and the surrounding metropolitan area through the inter-connected freeway system.

Although there are neighborhood impacts in the northern portion of the proposed facility, the overall effect will be to stabilize the residential character and control the spread of industrial-commercial development by focusing it on key areas rather than allowing it to diffuse throughout the neighborhood. Construction of Route 755 in this area will be utilized by the City as the impetus for a complete community development effort to re-established housing as a dominant value and provide needed improvements to parks, streets, and utilities.

Land Use

Changes in land use resulting from influences of Route 755 will extend along the length of the facility but will be most prominent at access and egress points into and from adjacent neighborhoods. From north to south, these points are St. Louis Avenue, Cole Street, Market/Olive Streets, Chouteau Avenue, and Lafayette Avenue. These streets will carry substantial auto and truck traffic accessing or exiting Route 755. Consequently, since land value is in part a function of accessibility, there will be increasing demand for more intensive commercial and industrial activities than are currently found along these key streets and abutting land. Although at this time it is not possible to predict

specific uses which will occur, certain general types can be mentioned with some confidence. Commercial activities that depend on motor vehicles, such as gasoline service stations, fast food restaurants, convenience markets, and drugstores would be prime candidates. Light industrial activities whose supplies or products are moved via truck traffic are also likely to be attracted to these areas, particularly in the central portion of the Route 755, between Chouteau Avenue and Cole Street.

These land use changes must be carefully considered and planned so that the significant advantages which are associated with these changes accrue to the benefit of adjacent neighborhoods and any negative impacts are curtailed. Of particular importance is the latter point, as residential neighborhoods are very sensitive to land use impacts. For example, a light industrial warehouse use with heavy truck traffic appropriate in the vicinity of Route 755 and St. Charles Street would be very inappropriate at Route 755 and North Market or St. Louis Avenues. Although truck traffic is vitally important to industrial functions, it is an unwanted intrusion in residential neighborhoods and must be carefully controlled.

The Murphy-Blair neighborhood is already adversely impacted by the location of numerous industrial-transportation land uses within its boundaries. The construction of Route 755 through Murphy-Blair must not be the vehicle for expansion of these incompatible land uses but rather the impetus for increased planning of complementary land relationships.

Land use changes as described herein are likely to have their most serious impacts on areas with well developed housing stock, particularly around St. Louis Place and the Lafayette Square Historic District. Pressure for new commercial development may be seen as conflicting with existing residential values. It is very important to focus the commercial development on appropriate locations (i.e. major intersections) so as to minimize adverse impacts on residential uses, and to serve as a buffer softening negative effects on the neighborhood.

Land use changes along the facility not beneficial to the existing urban fabric stemming from air, noise, and visual impacts may be modified and abated through mitigation measures.

If existing urban interstate facilities are used as examples, total land use along these routes only infrequently experiences drastic change. However, slow long-term changes may result from impacts on the quality of life as perceived by area residents. These types of change are very difficult to measure and predict yet are among the most important from the standpoint of neighborhood residents.

Housing

The Revised DEIS estimated the number of individuals and families displaced by Route 755 at 2016 and 576 respectively. A detailed

re-analysis of population relocation within the Route 755 right-of-way was done in May and June of 1979 by the City Building Division. Results of that study indicate that 177 residential structures in the right-of-way were razed since MSHD's survey in 1978 and an additional 155 vacated. Therefore, the Building Division determined that only 970 individuals comprising 371 families would have to be moved if the proposed facility were built at this time. These findings are substantially lower than the data given in the DEIS indicating lower relocation costs and lessened socioeconomic impacts on the affected neighborhoods. The City has already entered into a contractual obligation in its Neighborhood Strategy Areas program with the United States Department of Housing and Urban Development to assure that replacement housing for relocated residents will be provided within their neighborhoods.

No study of housing outside of the proposed right-of-way has been performed. Nevertheless, Booker, through frequent field investigations, has conducted a general survey of housing conditions in areas traversed by Route 755 and has drawn some general conclusions.

First, no adverse impacts on housing in the southern section are anticipated. Rather increased access to the area is thought to provide significant benefits for continued renovation of the housing stock.

Second, in the central and northern sections of the proposed facility, where it passes through the Murphy-Blair neighborhood, the increased access and heightened commercial opportunities may further stimulate residential investment and renovation. Significant changes to Murphy-Blair's housing stock are currently underway. Programs combining Federal, State, City, and private funds are being proposed and funded, offering over four hundred new and rehabilitated units to small families, large families, and the elderly which are both subsidy and market rate in nature. Many of these housing units have been approved only recently, including 141 newly constructed units for the elderly at Murphy-Blair Commons, 117 new townhouses for small families at Murphy-Blair Gardens, 12 scattered site Section 8 rehabilitated units, and 25 scattered site market rate houses. An additional 125 Section 8 units have been set aside for the Murphy-Blair area under the Neighborhood Strategy Area program. Depending on the specific urban design details used for Route 755 where it passes through the residential areas, the freeway can offer significant benefits to housing or can be a neutral or even negative influence.

The majority of direct impacts on housing generated by the proposed facility will affect the Murphy-Blair neighborhood rather than the Lafayette Square area or the Montgomery neighborhood because most of the residential units planned to be removed are located in Murphy-Blair. Removal of the units will have several major impacts on the neighborhood. The immediate short-term effects would be to relocate approximately one thousand occupants and remove those units from the available housing stock. However, equally important are the long-term effects of eliminating a sizable portion of the neighborhood housing and permanently precluding

its use. In this way, future potential residents are also affected as their housing choice in Murphy-Blair is irrevocably limited.

Another serious problem affecting housing in residential areas adjacent to Route 755 are incursions of industrial and transportation related uses. The Murphy-Blair neighborhood, particularly over the past several decades, has experienced the ecological invasion and succession cycle with industrial uses dominating residential uses in locations abutting the Cass Industrial Area. As a consequence, today much of the land in this area is interspersed with industrial uses which generate substantial truck traffic on local residential streets. This industrial movement has effectively displaced many residents and threatens to continue in this configuration unless positive actions are soon taken.

The proposed freeway is viewed by Murphy-Blair residents as a catalyst reacting with Cass Industrial Area to cause increased industrial usurpation of residential land and continued destruction of precious housing values through adverse impacts of noise, truck traffic, fumes, etc. With comprehensive planning for these developments on the part of the City agencies, key residential areas may be enhanced and protected from intrusion by incompatible uses.

The City should act to establish controls limiting the geographic expansion of industrial uses into sensitive neighborhoods, while providing direct and indirect assistance in the re-establishment of residential and cultural values and realities by making certain the appropriate urban design elements are utilized in Route 755 and efficient neighborhood redevelopment plans are enacted.

The accomplishment of these objectives requires several specific steps:

1. establish and enforce zoning regulations limiting intrusion of industrial land uses into residential areas;
2. establish and enforce traffic regulations restricting commercial/industrial truck use of as well as parking on residential streets;
3. expand the present boundaries of Cass Industrial Area recognizing the actual industrial land uses to the north and northwest and incorporating them into the industrial district;
4. prepare Master Plans for the Cass Industrial Area and the former Pruitt-Igoe site, with a major citizen participation element, ensuring adverse impacts (visual, aesthetic, noise, air, etc.), are buffered appropriately at the edges of the industrial districts;
5. prepare a Comprehensive Redevelopment Plan, considering Route 755 as existing entity, utilizing existing state urban renewal

legislation (Land Clearance Redevelopment Act - RSMo 99.300), with a major citizen participation effort, emphasizing existing and potential residential-cultural values and identifying areas for new development, renovation and rehabilitation, in-fill housing, and total redevelopment; and

6. select urban design alternatives which will provide maximum protection and enhancement for the neighborhoods as related to the Comprehensive Development Plan and considering the construction of Route 755 as a reality.

The above points are very significant as they will insure that, even considering the proposed freeway's disruption of established neighborhood institutions, many existing and potential residential-cultural features are protected and enhanced and industrial intrusion into residential areas is controlled.

Basically, as is illustrated in the neighborhoods traversed by the proposed facility, lower income populations occupy lower cost housing. There are no reasons to believe this relationship will vary drastically after the proposed freeway is constructed and the affected people relocated. Therefore, it is reasonable to assume that nearby lower cost residential units will attract the affected populace. As is demonstrated in the DEIS, such housing is readily available on a continuing basis in the Murphy-Blair, Hyde Park, and Montgomery neighborhoods. Subsequent to the publication of the DEIS, the City has by contract entered into the Neighborhood Strategy Area program with H.U.D., as mentioned earlier. The Section 8 units currently in process, planned, and available in HUD-committed set-asides will provide a significant resource of quality low-income housing in these neighborhoods. The City of Saint Louis is thus obligated to ensure that dislocated residents will have safe, decent, and sanitary housing choices within their neighborhoods. Well established social and economic factors will strongly influence the relocated population to remain with the City and most probably within the general confines of the neighborhoods specified above. However, it is impossible to even generally estimate the exact locations of residential units which may be selected by relocatees without detailed socioeconomic data and availability of sophisticated computer-assisted simulation programs.

Schools

The schools impacted by the proposed Route 755 are listed in the following table. Districts, grade ranges, and enrollment statistics are available, but the St. Louis Board of Education has no information on travel patterns between residences and schools as no study has ever been concerned with this situation.

Three high school districts (McKinley, Vashon, and Central) are adversely impacted to some extent as the proposed Route 755 nearly divides each in half geographically. As each high school's district is comprised

of feeder elementary schools, the high schools are impacted to the same extent as those feeder elementary schools.

McKinley High School is impacted by changes to two feeder elementary schools, Sigel (391 students) and Clinton (455), both of which comprise a large percentage of McKinley's enrollment, although figures are not available substantiating the number of actual students who advance from the eighth grade to the ninth in making the transition from elementary to high school. McKinley draws from ten feeder schools and has an enrollment of 932. The combined enrollment of these two impacted schools is 846. Clinton's gain in enrollment over the 1975 school census listed in the EIS is due to the fact that Clinton Branch is closed and is currently used for administrative and storage purposes. Clinton Branch is directly in the path of the proposed Route 755 and will be demolished during construction of the freeway. Clinton School will front on the east outer road and will be directly impacted by high levels of noise.

The feeder elementary schools impacted in the Vashon High School district are Franklin (414), Blewett (608), Jefferson (551), Pruitt (closed as a feeder elementary school but active as an alternate secondary school with 355 students), and Carr Lane (255). Of these impacted schools, Pruitt will be taken with the development of the proposed Route 755 as it lies directly in the path of the highway. The 355 students attending Pruitt come from no particular district and are assumed to commute via motor vehicles as opposed to walking.

Central High School will be impacted by changes to Blair (475), Blewett (608), and Ames (479) Schools. Howard Branch, a school in the Blair district and once a feeder elementary for Central, has been closed for several years and the building stands vacant. Howard School, which has an enrollment of 164, will be closed at the end of the 1978-1979 school year and the students will be transferred to Blair School. The students who attended Howard in 1978-1979 will not be inconvenienced by the proposed Route 755 in relationship to their travel to and from Blair as both their residences and Blair are east of Route 755. Some of the students of Blair, however, will be directly affected as 755 will cross between their residences and Blair. A portion of the Blewett School district will be impacted by the proposed Route 755 physically absorbing several blocks on 20th Street which are, for the most part, vacant. Eighteen square blocks in the Ames School district will either directly be in the path of Route 755 or will be separated from Ames by the freeway.

Over the entire length of the proposed Route 755, the following elementary schools will be severed from a portion of the residences now being served, prompting some re-routing of present travel paths to and from them: Ames, Blair, Pruitt, Franklin, and Clinton. Blewett will lose a portion of its district directly to Route 755, but it will not divide the district. Metro High School is near the proposed route, but has no district as it serves as a magnet school and travel patterns to it cannot be determined.

Table 3

ELEMENTARY SCHOOLS
ENROLLMENT - SPRING, 1979

Route 755 will involve the following Elementary School Districts and Parochial Schools in the City of St. Louis.

District	Elementary School	*Grade Span	Total
Clinton	Clinton	K, 4-8	455
Clinton	**Clinton Branch		Closed
Waring	Waring	K-8	332
Franklin	Franklin	K-8	414
Blewett	Carr Lane	4-5	255
Blewett	Carr Lane Branch		Closed
Blewett	***Pruitt		355
Blewett	Jefferson	K-8	551
Blair	Blair	K-8	475
Blair	Howard Branch	K-8	Closed
Blair	Howard	K-8	Closed
Jackson	Blewett	K-8	608
Jackson	Jackson	K-8	372
Ames	Ames	K-8	479
Clay	Clay	K-8	674
Sigel	Sigel	K-8	391
	****Zion Lutheran	K-8	150
			5,179

* K = Kindergarten

** School to be dislocated by Route 755 and inactive since the fall of 1977.

*** School to be dislocated by Route 755. The present facility is used as a tutorial school. Alternate secondary school - no district/commuter.

**** 1979 figures unconfirmed.

Contrary to the findings of the DEIS, proposed Route 755 is not entirely compatible with existing school district boundaries. Ames, Blair, Franklin, and Clinton will have large portions of their districts severed from their school facilities although actual numbers of students affected cannot be determined as neither the DEIS nor the Board of Education provided any indication of where the students live. Ames, Blair, and Clinton Schools definitely will be severed from residential areas by Route 755 and Franklin will be severed from an apparent commercial/industrial district. Two schools, Pruitt (presently active with 355 students) and Clinton Branch (presently viable for administrative/ storage purposes), will be demolished in the path of 755.

In addition to the above material, one particular school, Clinton, is more directly impacted by Route 755 than any other in the St. Louis School District because Clinton immediately abuts the proposed facility. The DEIS does not specifically address the numerous environmental impacts on Clinton School, other than to state that noise levels at the school will be 79 dBA at L₁₀, a level which will certainly cause adverse impacts. Therefore, the general environmental impacts on Clinton School are described qualitatively below to permit City officials and school administrators to at least partially understand the situation which will develop at Clinton School when Route 755 is constructed and in use.

A number of very important impacts caused by Route 755 will affect students and staff at Clinton School. Among the most important are pedestrian and vehicle circulation, safety, air pollution, and noise and vibration effects.

Highway-related noise is by far the most frequently cited negative impact in the professional literature¹ and appears to be the impact causing the greatest disruption of school functions. The major sources of long-term noise will be freeway related truck traffic and emergency vehicles bound for City Hospital. Important short-term but highly disruptive noises will be caused by highway construction.

The effects of noise on the teaching/learning process are to interfere with and disrupt it intermittantly throughout the school day, both indoors in classrooms and outdoors on the playfield. The length of the disruptions is very disproportionate to the sound, frequently lasting several hundred times longer. In addition to speech and hearing interference, severe noise frequently is associated with aggressive behavior, especially outside in play situations.

The impacts of vibration from construction and operation of Route 755 may cause similar disruption of school activities but these impacts will most likely be of less severity. However, because the DEIS does not address them, it is impossible to estimate their effects on school activities.

¹ Marshall Kaplan, Gaus, and Kahn; and Alan M. Vorhees and Associates. Schools Located Near Highways: Problems and Prospects; Final Report. August, 1977, FHWA Washington, D.C.

Perhaps the single most important impact of the proposed freeway on Clinton School is on pedestrian safety. In the revised DEIS design, a north-bound Route 755 access ramp passed directly in front of Clinton School, inevitably mixing pedestrian and vehicular circulation. Although subsequent redesign of this situation by Booker has resulted in the elimination of the ramp, the problem of student safety remains and should be addressed by MSHD in the DEIS.

Another key problem concerns the effects of air pollution on students and staff of Clinton. That this problem is important can be seen in that three major freeways (I-55, I-44, and Route 755) merge less than two thousand feet from Clinton School. In numerous instances reported in the professional literature, students at schools immediately adjacent to freeways reported suffering headaches and nausea and diminution of athletic ability, effects attributed by medical experts to concentration of highway generated air pollutants.

Also not considered in the DEIS are the fiscal impacts the proposed facility may have on school district revenues raised by means of property tax assessments and on possible loss of student enrollment. Adverse impacts generated by the freeway may cause increases in operating costs and decreases in revenue but, without detailed data, the exact nature of the range of possible impacts can only be the subject of speculation.

Design Alternatives

At the request of the City, Booker also investigated a number of unique or "non-routine" design alternatives to moderate significantly the adverse impacts of the Route 755 on adjacent residential neighborhoods. The key objective--preservation of the existing urban fabric--generated alternatives which range from enclosed tunnels to an open freeway with caps or covers at sensitive locations. Of the six alternatives studied, the Limited Cap Alternative appeared to offer a possible alternative and, therefore, is presented with more graphic and textural details than the others.

The scope of this study is too limited to justify any type of economic justification for these alternatives and they are, therefore, presented only as an indication of other "non-routine" measures that could be undertaken if sufficient funds were available. It is recommended that more extensive studies be made before adopting or rejecting any of these alternatives.

Limited Cap Alternative

The caps constructed over the proposed highway would vary in size from approximately 65 feet to a maximum of 350 feet. Actual size of the caps would be dependent upon specific location and intended development programs. Alternative treatments range from small terraces consisting of a variety of street furniture and landscaping for the smaller caps to

extensive plaza areas comprised of benches, conversation areas, game tables, kiosks, water features, multi-purpose shelters, landscaping, and bus waiting stations for the larger caps. Other recreational treatments suitable for the caps include tot-lots, tennis courts, multi-purpose courts, amphitheaters, garden plots, and skateboard facilities (See Figures 7 and 8).

A landscaped bikeway/walkway would be developed to link the caps together and also to allow and encourage pedestrian and bike movements between neighborhoods. A variety of noise abatement and aesthetic treatments would be constructed in residential areas between caps. These treatments should be tailored to meet the needs of each particular neighborhood according to the severity of the noise, sensitivity of adjacent receptors, and nature of the neighborhood.

The purpose of these caps is to integrate the proposed facility into the existing urban fabric. These "lids" over the highway would soften the facility's adverse impacts, provide focal points for neighborhood recreation activities, and ensure that previously established inter- and intra-neighborhood social and travel patterns can be resumed after Route 755 is in place and functioning.

Extensive Cap Alternative

A series of ten caps, 500 feet in length, would be developed over the proposed facility at sensitive areas in neighborhoods abutting Route 755. The development of these caps would be similar in nature to that of the Limited Caps though more intensive and broader in the kinds of activities involved. A bikeway/walkway would be provided linking the caps and various neighborhoods.

Tunnel Alternative

Superblock Concept: On top of the covered highway an extensive park system and continuous greenbelt system would be developed from Lafayette to Chouteau and Carr to Branch. This greenbelt/part system would be developed into super-blocks intersected by only a few selected streets. Residents of the adjacent neighborhoods would have pedestrian, bicycle, and auto access to the park system at numerous points and also would be able to cross over the park from one side of Route 755 to the other without restriction. All adverse noise and visual impacts would still be displaced and housing stock in the right-in-way eliminated.

Parkway Concept: The outer, parallel access road system of Route 755 would be constructed on top of the tunnel structure. These one-way roads would be separated by a wide landscaped median to create a continuous parkway. Access to Route 755 will be in the same locations as planned in the DEIS as would be intersecting streets. No outer access roads would be provided between Chouteau and Market.

Neighborhood Preservation Concept: All possible streets within the Route 755 right-of-way would be reconstructed to the same specifications in their existing locations. Although all existing residential or industrial structures would be removed in this concept, the neighborhoods essentially would be preserved intact, with the very same pedestrian and vehicular circulation and social patterns as exist at this time. Where possible landscape plantings and linear park treatments will modify the surface right-of-way.

Booker Modified Design

Modifications to MSHD's DEIS and strip map included use of state-of-the-art noise control structures along the proposed facility in every residential area from Lafayette to Chouteau Avenues and Carr to Branch Streets. Although these innovative noise treatments are very effective in mitigating noise and aesthetic problems, they are much more expensive to construct than more conventional techniques. These measures include typical walls, berms, and plantings as well as textured acoustical panels in a variety of sizes and shapes and combinations of brick and wood to integrate these noise treatments into the existing urban neighborhoods. In certain neighborhoods, it may be possible to reduce costs significantly by use of more conventional noise reduction techniques.

Costs

Order of magnitude costs were prepared for the alternatives listed above. These costs include additional structures, all noise abatement features, and roadways. Costs not included are excavation, landscaping, and engineering. The estimates are in 1979 dollars.

<u>Alternative</u>	<u>Million</u>
Limited Cap	\$100
Extensive Cap	\$110
Super-Block Tunnel	\$135
Parkway Tunnel	\$135
Neighborhood Preservation Tunnel	\$135
Booker Modified Design	\$ 85

Parkway Alternative

The feasibility of constructing Route 755 as an at-grade facility from Cole Street north to I-70, was analyzed in terms of socioeconomic impacts affecting adjacent residential neighborhoods. The resulting parkway would have ten or twelve traffic lanes and would be designed to carry approximately the same volumes as the proposed MSHD design.

As an at-grade facility, Route 755 in many ways would generate similar yet more severe impacts than a depressed facility. The neighborhoods would be split by the facility in much the same manner as in the DEIS; with somewhat smaller right-of-way requirements it would result in fewer population and business relocations. It would cause numerous pedestrian safety problems due to its at-grade nature. These hazards would be especially prominent in the northern section with its dense population and large numbers of school-aged children.

Adverse aesthetic impacts of a parkway would also be more severe. Screen walls and plantings would be only partially effective in integrating the parkway into the neighborhood.

An at-grade parkway alternative would be feasible in the strictest sense yet would have little to recommend it over a depressed facility. Adverse socioeconomic impacts would be magnified and rendered much more difficult to mitigate if such a design alternative were adopted.



ROUTE 755, ST. LOUIS CITY **North South Distributor Freeway**

ENGINEERING ALTERNATIVES



North South Distributor Freeway

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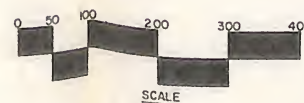
Date: September 1979

Plate I



ROUTE 755, ST. LOUIS CITY **North South Distributor Freeway**

ENGINEERING ALTERNATIVES

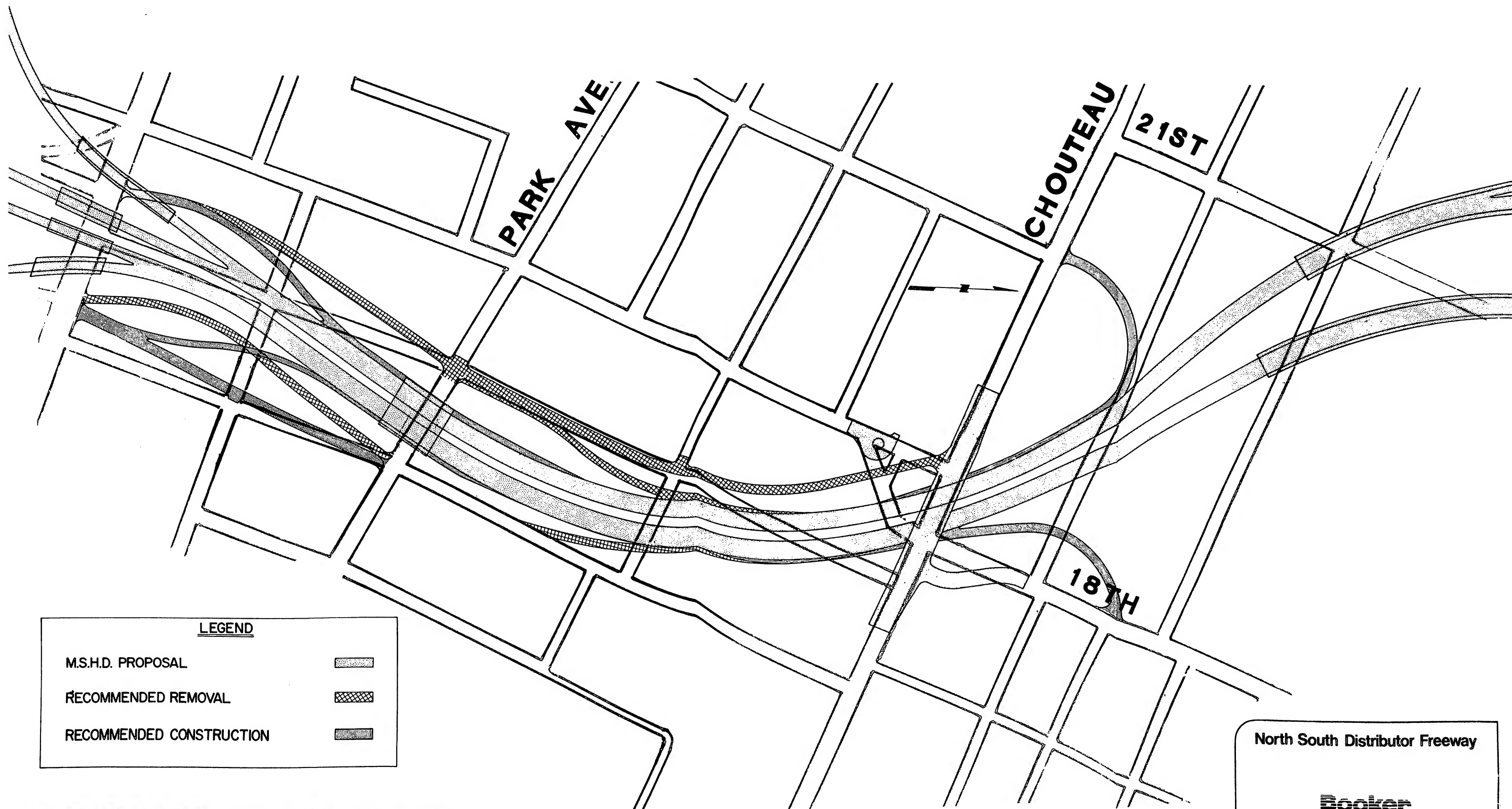


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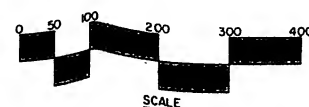
Date: September 1979

Plate II



ROUTE 755, ST. LOUIS CITY
North South Distributor Freeway

ENGINEERING ALTERNATIVES



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Plate III



ROUTE 755, ST. LOUIS CITY **North South Distributor Freeway**

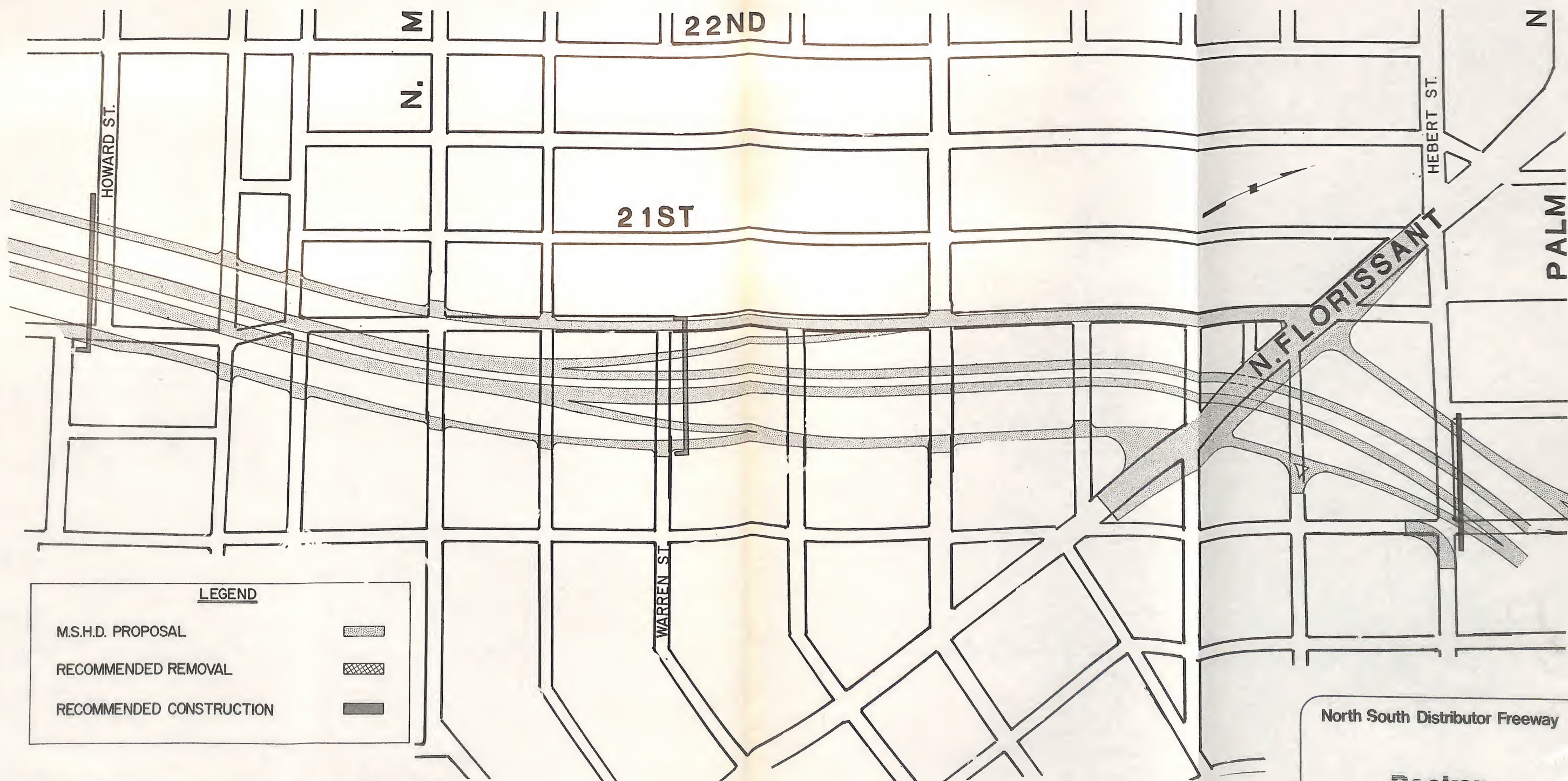
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Plate IV



ROUTE 755, ST. LOUIS CITY
North South Distributor Freeway

ENGINEERING ALTERNATIVES



North South Distributor Freeway

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Plate **V**

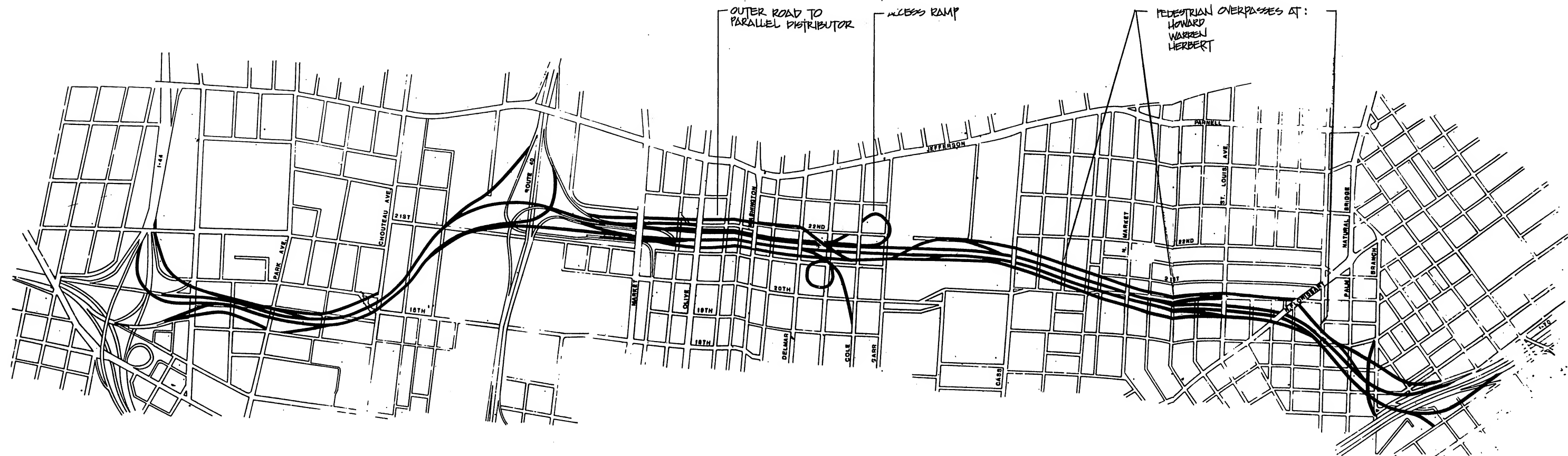
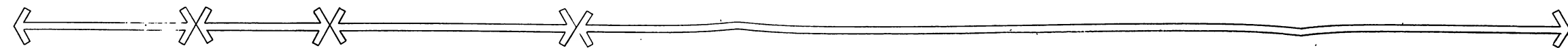
Adjacent Land Use	I-44	Residential	Industrial	I-40	Commercial & Industrial	Residential	Mixed Residential & Industrial	I-70
Highway Profile	Elevated section	Recessed section	Elevated section of highway	Recessed section of highway				Elevated section

NO SPECIAL TREATMENT
FOR ELEVATED SECTION

NO SPECIAL
TREATMENT FOR
RECESSED SECTION

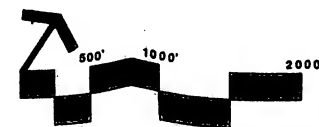
NO SPECIAL TREATMENT
FOR ELEVATED SECTION

RECESSED SECTION OF HIGHWAY TO BE BERMED AND PLANTED
WALLS WILL BE UTILIZED FOR SOUND ABATEMENT
SEE FIGURES 4.3.6 FOR WALL TREATMENT



ROUTE 755, ST. LOUIS CITY **North South Distributor Freeway**

Proposed M.S.H.D. Design



North South Distributor Freeway

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Figure 1

Adjacent Land Use	I-44	Residential	Industrial	I-40	Commercial & Industrial	Residential	Mixed Residential & Industrial	I-70
Highway Profile	Recessed section of highway		Elevated section of highway		Recessed section of highway			Elevated section

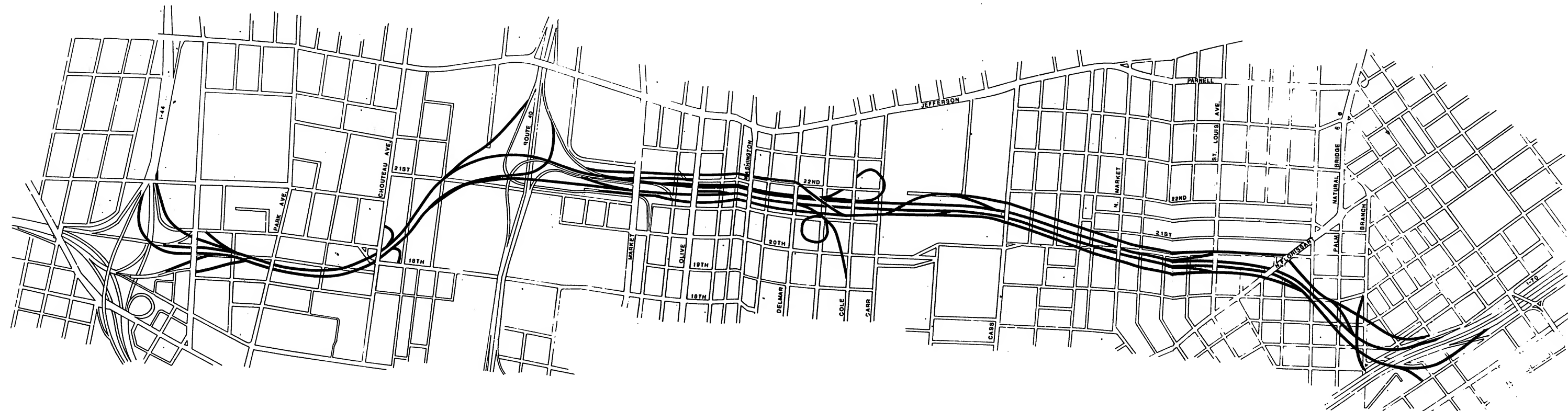
COMBINATION OF WALLS, TREES & BERMS FOR SOUND ABATEMENT TREATMENTS SEE FIGURES 4.5.0 FOR TYPICAL TREATMENT

NO SPECIAL TREATMENT OF ELEVATED SECTION OF HIGHWAY

NO SPECIAL TREATMENT FOR SOUND ABATEMENT OTHER THAN DISPERSED VEGETATION ON GRASSY SLOPES SEE FIG. 6 FOR TYPICAL TREATMENT

TREATMENT UTILIZING WALLS, BERMS & PLANTINGS WILL BE REQUIRED BETWEEN CARRIAGES

SPECIAL TREATMENT UTILIZING A COMBINATION OF BERMS, WALLS & PLANTINGS FOR AESTHETIC & VISUAL ABATEMENT FROM CASS THROUGH BRANCH



ROUTE 755, ST. LOUIS CITY North South Distributor Freeway

Modified M.S.H.D. Design



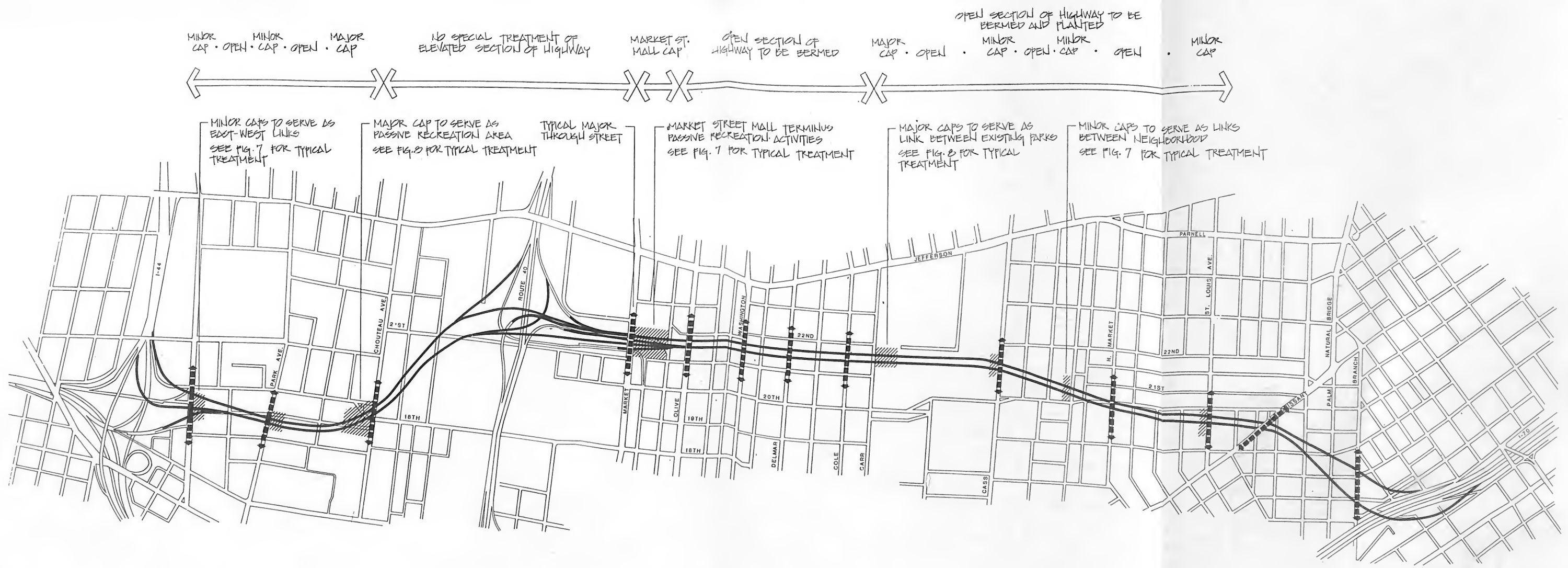
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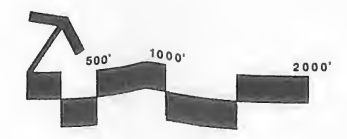
Figure 2

Adjacent Land Use	I-44	Residential	Industrial	I-40	Commercial & Industrial	Residential	Mixed Residential & Industrial	I-70
Highway Profile	Recessed section of highway		Elevated section of highway		Recessed section of highway			Elevated section



ROUTE 755, ST. LOUIS CITY North South Distributor Freeway

Capped Concept



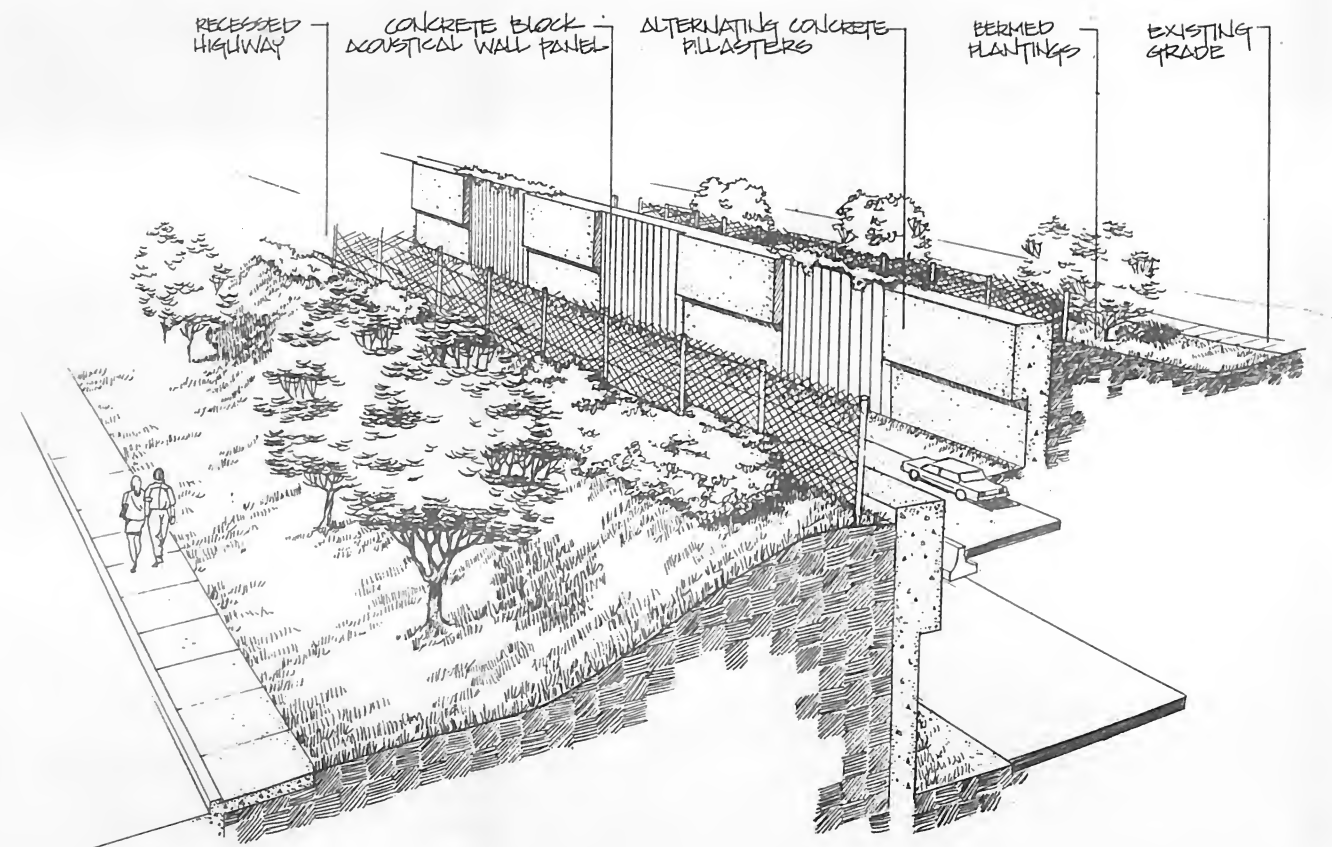
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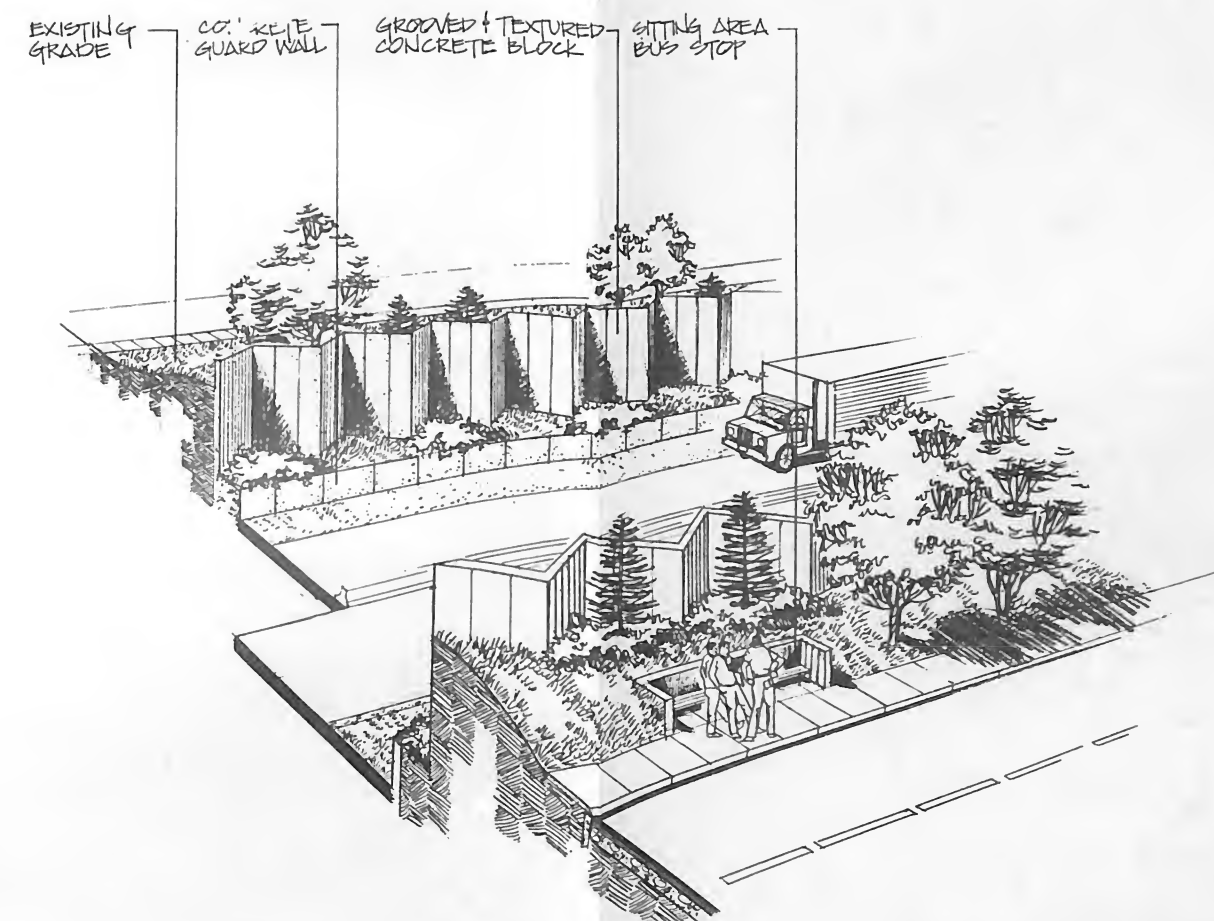
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Figure 3



TYPICAL 4-A
ACOUSTICAL-PANELED WALL DESIGN



TYPICAL 4-B
CASTELLATED WALL DESIGN

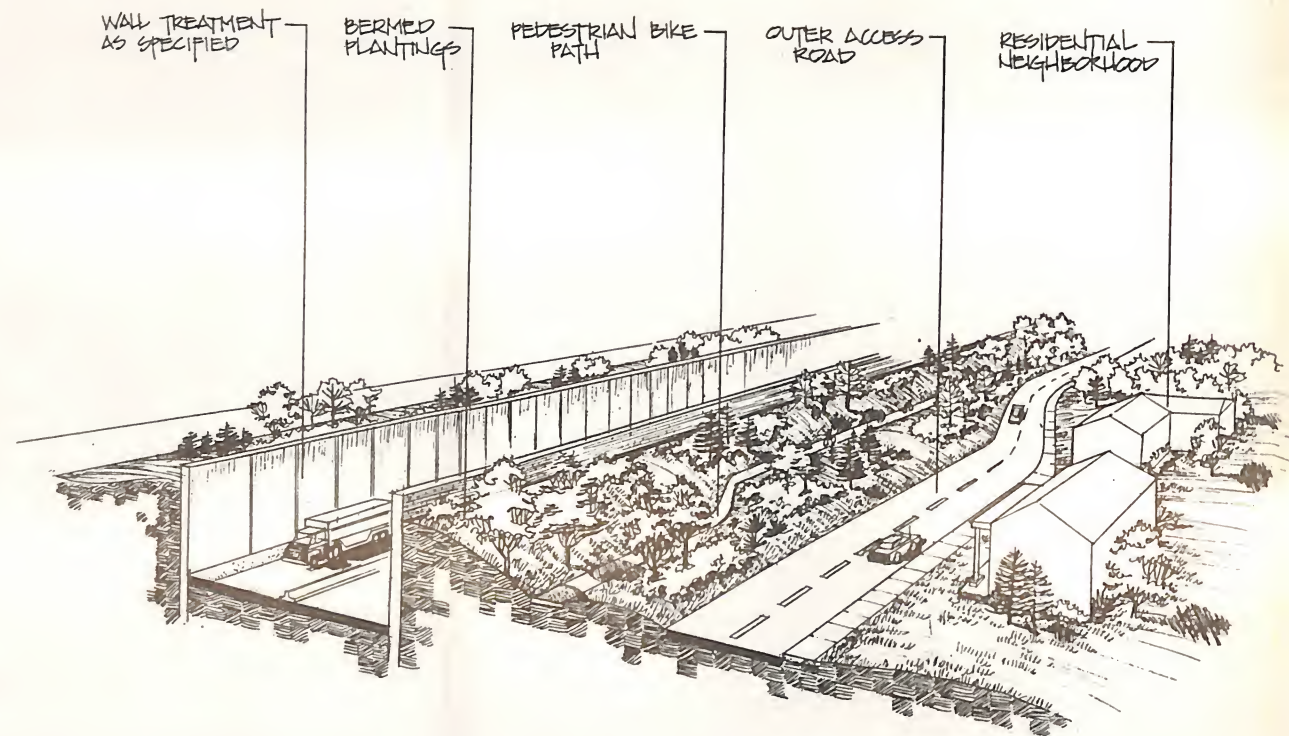
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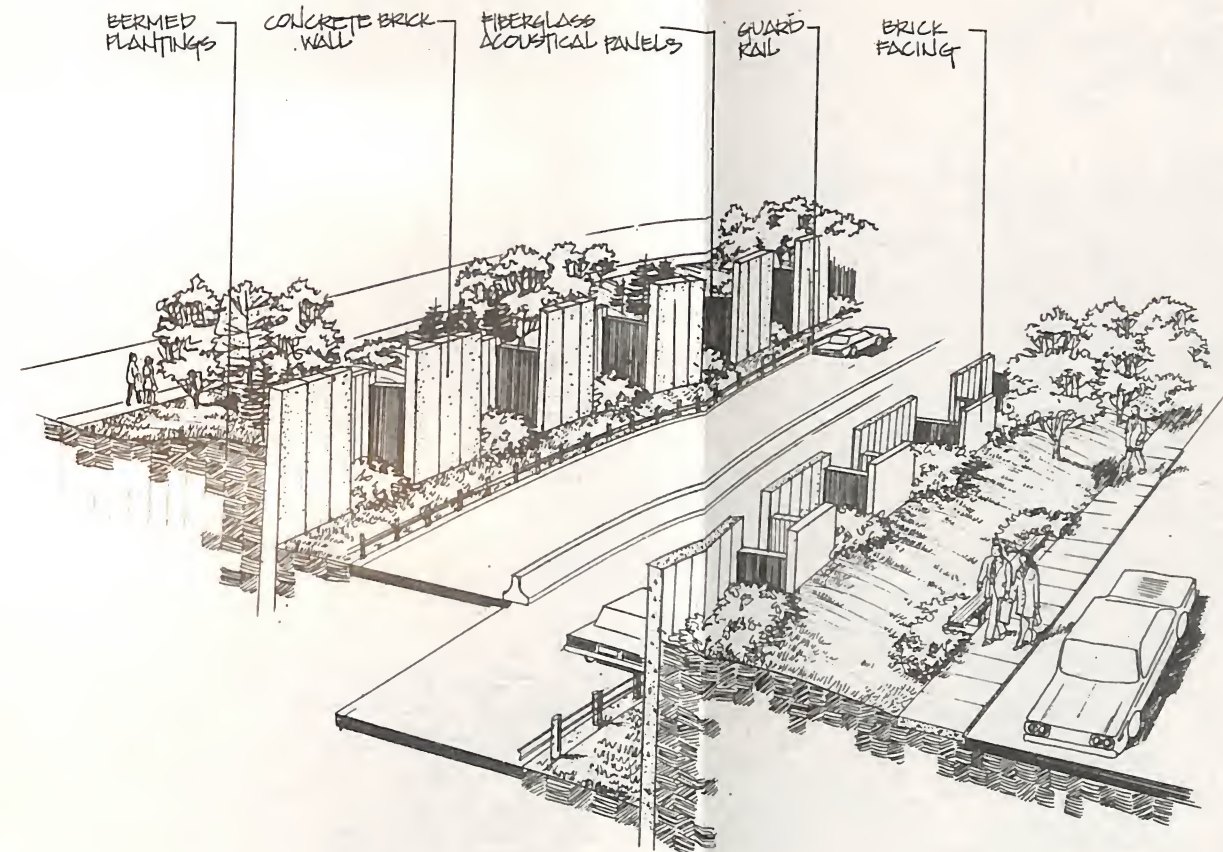
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Figure 4



TYPICAL 5-A
RIGHT OF WAY IN RESIDENTIAL AREA

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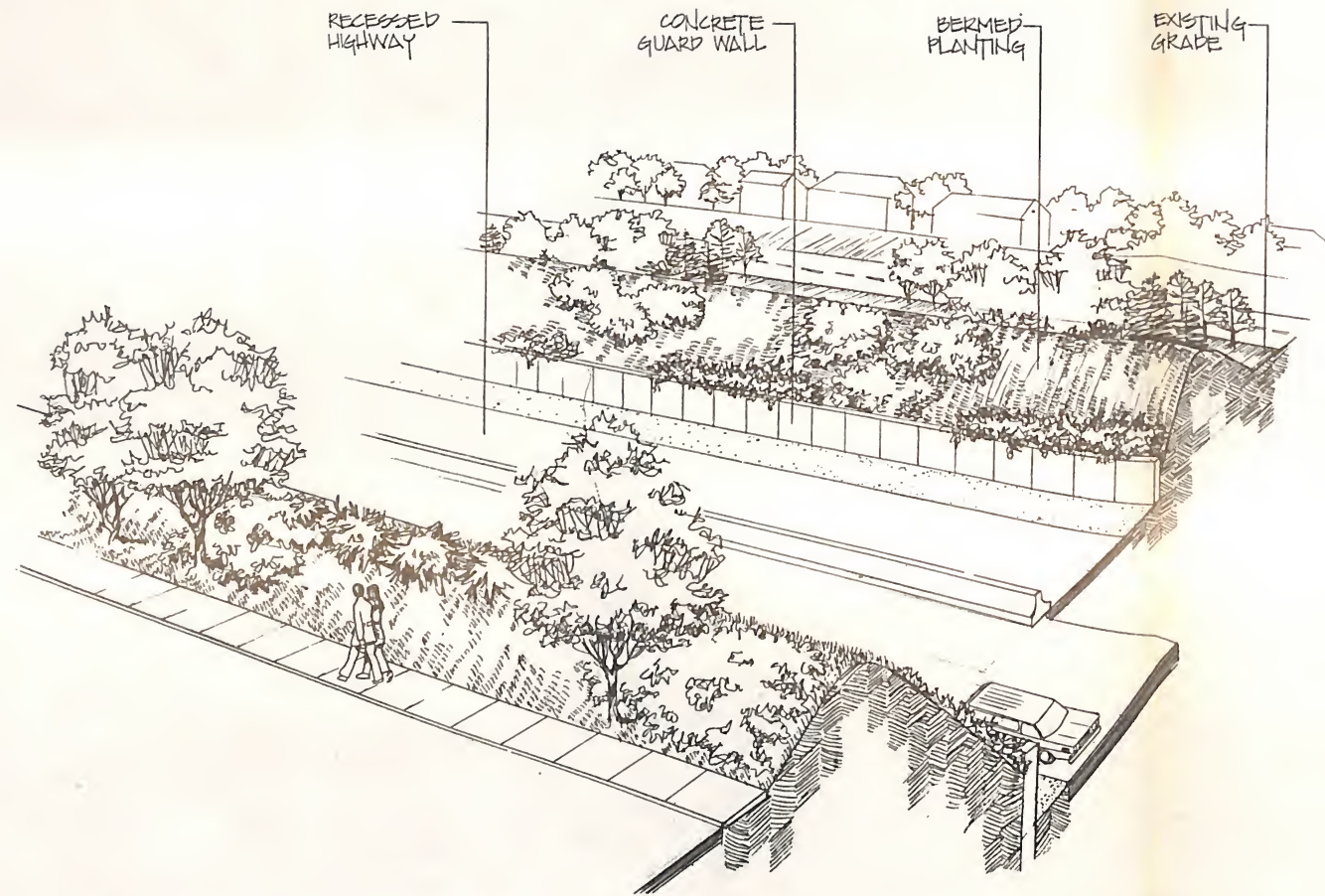
TYPICAL 5-B
CASTELLATED WALL UTILIZING ACOUSTICAL PANELS

North South Distributor Freeway

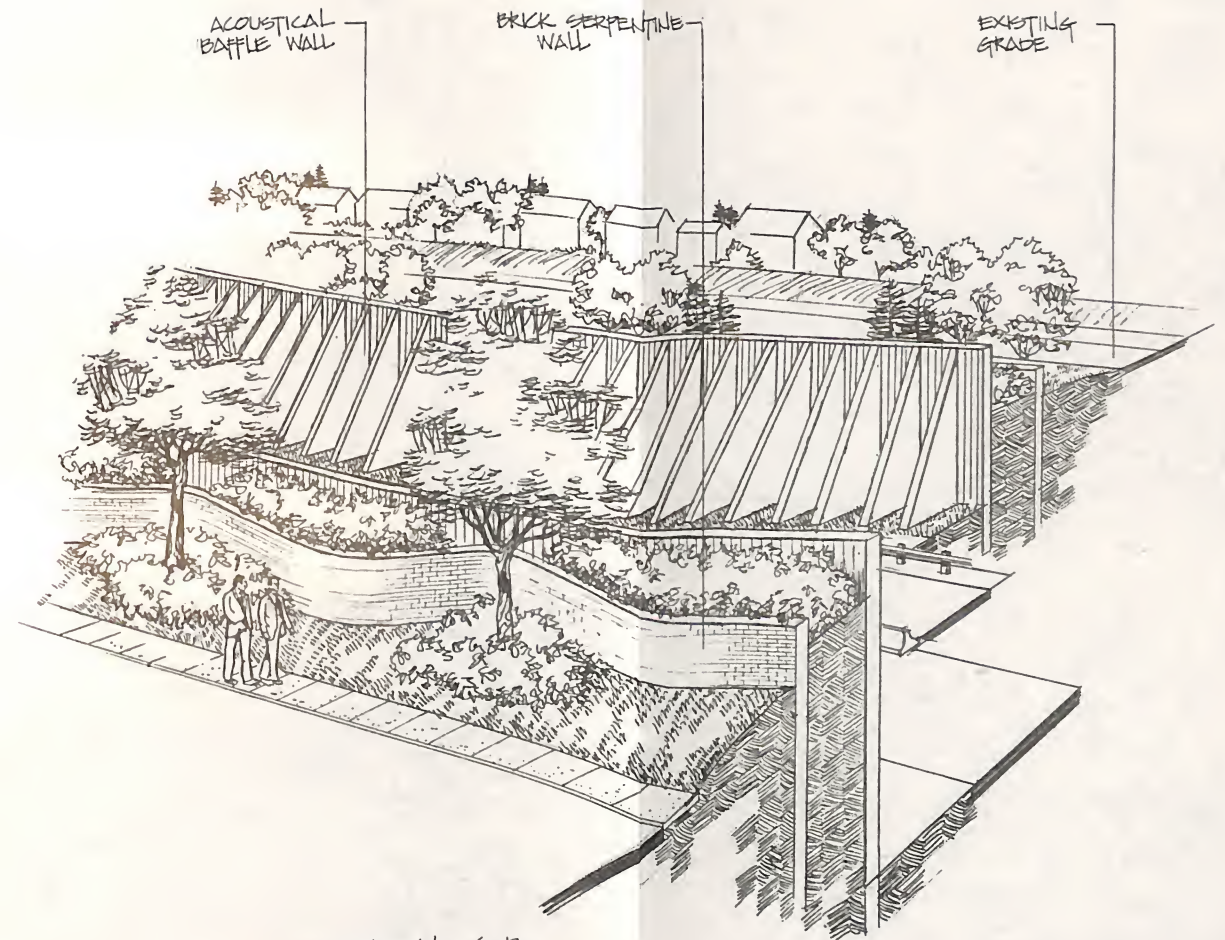
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Figure 5



TYPICAL 6-A
BIRM AND PLANTING TREATMENT



TYPICAL 6-B
SERPENTINE DOUBLE-WALL TREATMENT

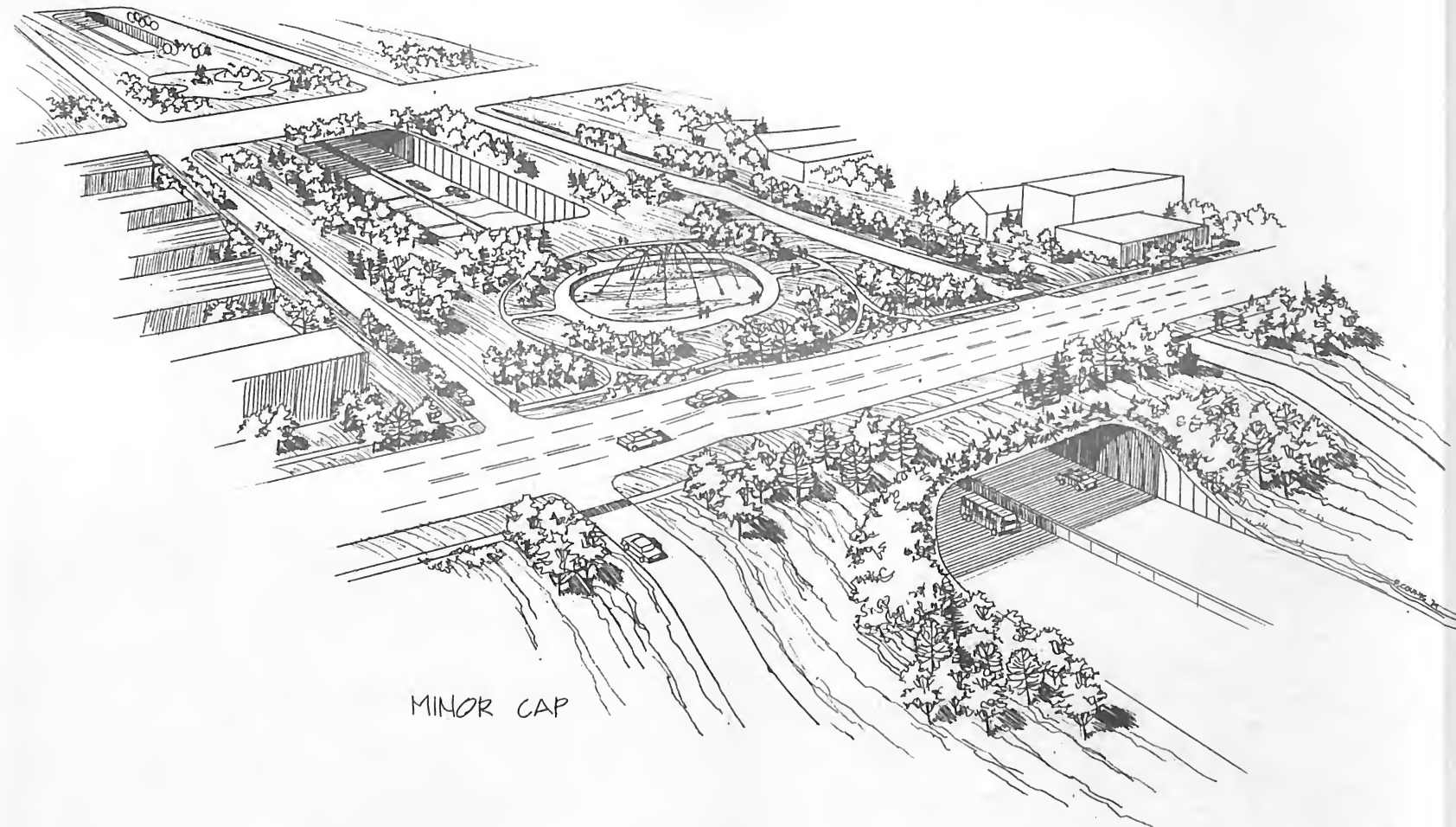
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Figure 6



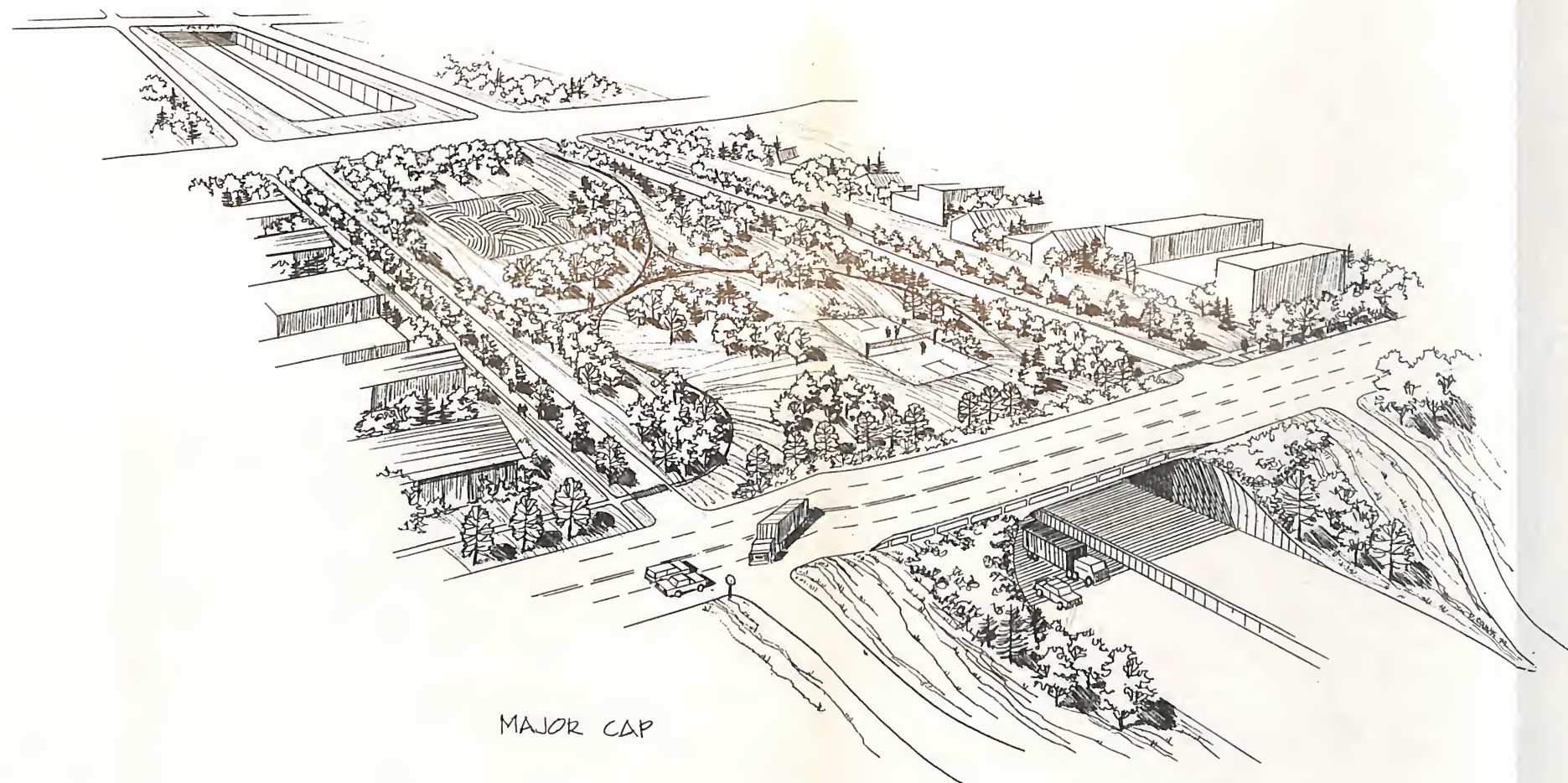
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Figure 7



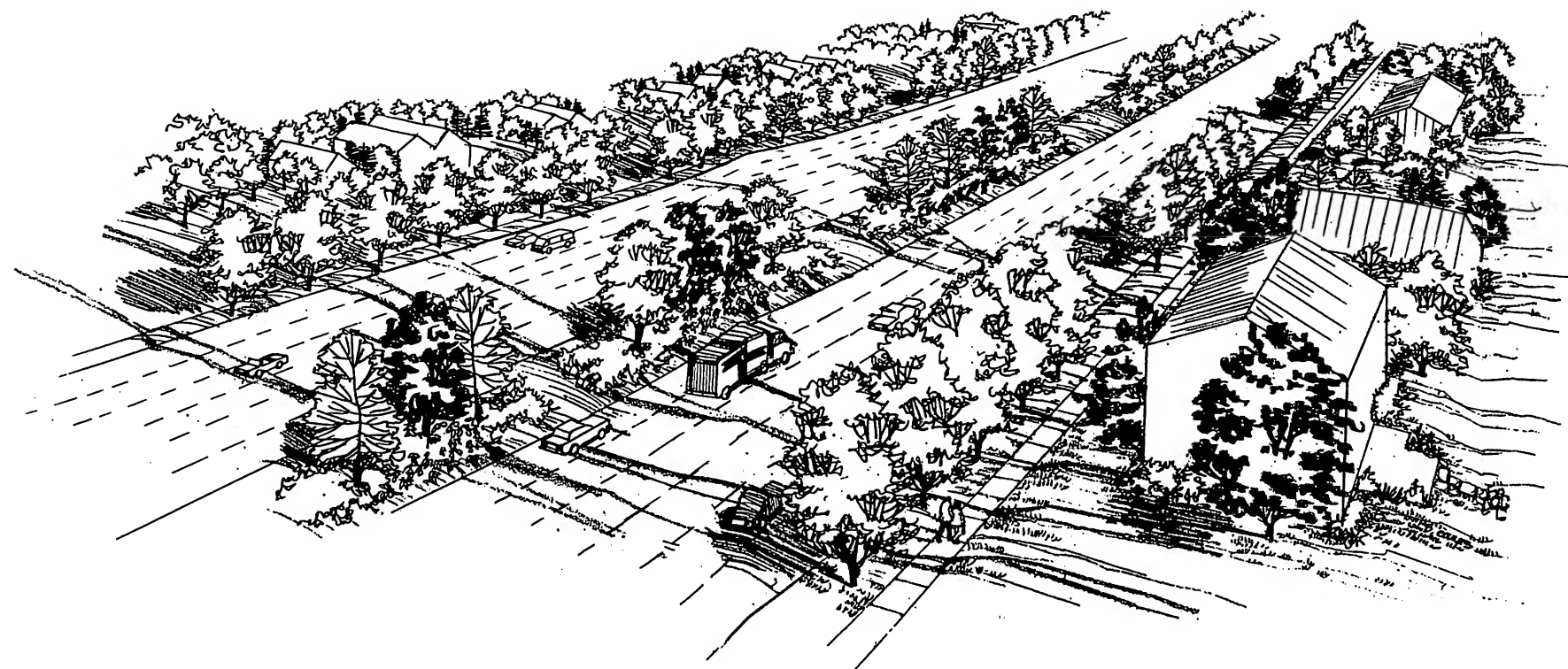
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Figure 8



PARKWAY CONCEPT A (12 LANE)

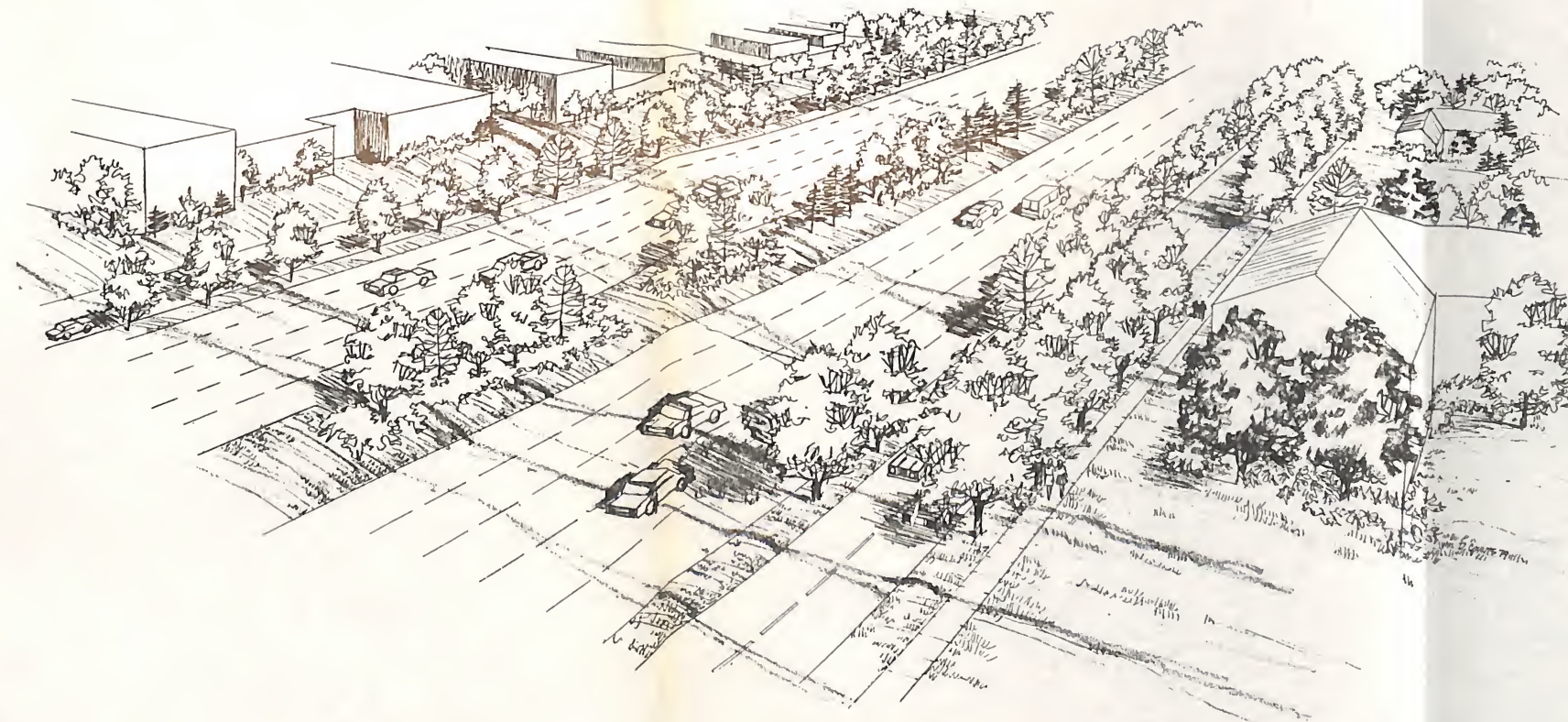
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Figure 9



PARKWAY CONCEPT B (10 LANE)

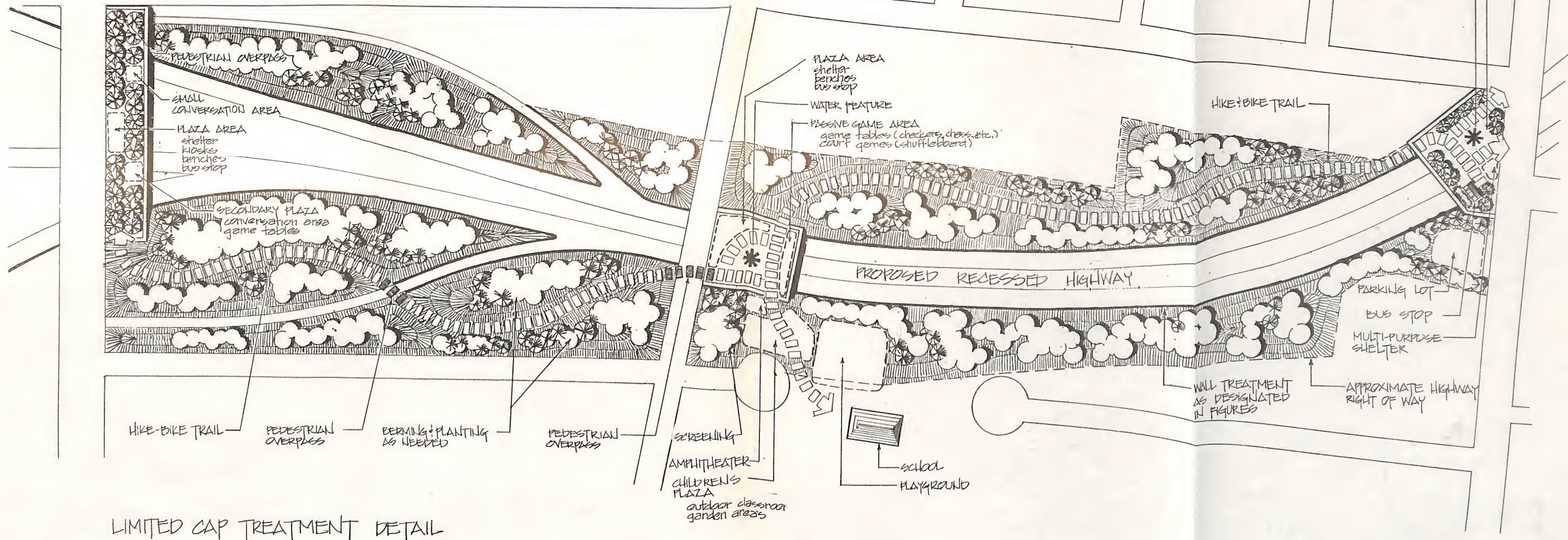
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Figure 10



LIMITED CAP TREATMENT DETAIL

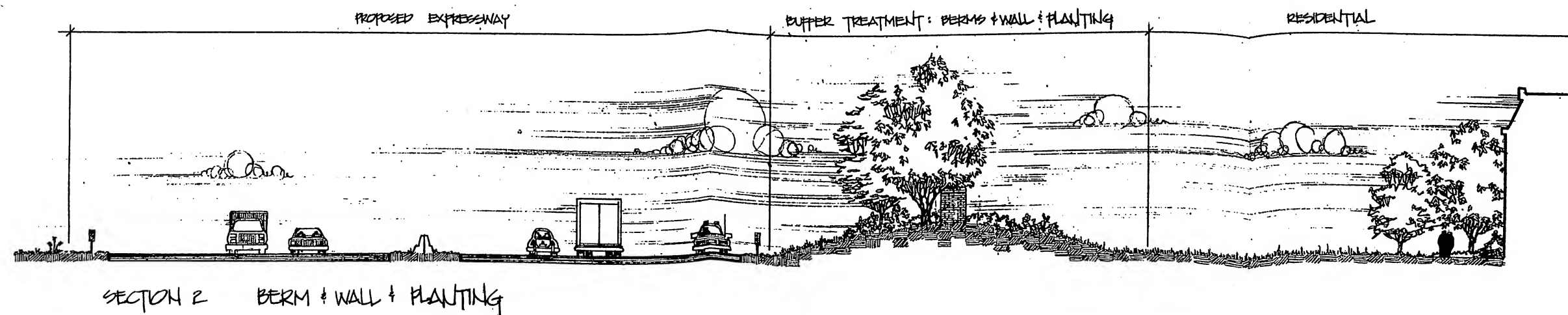
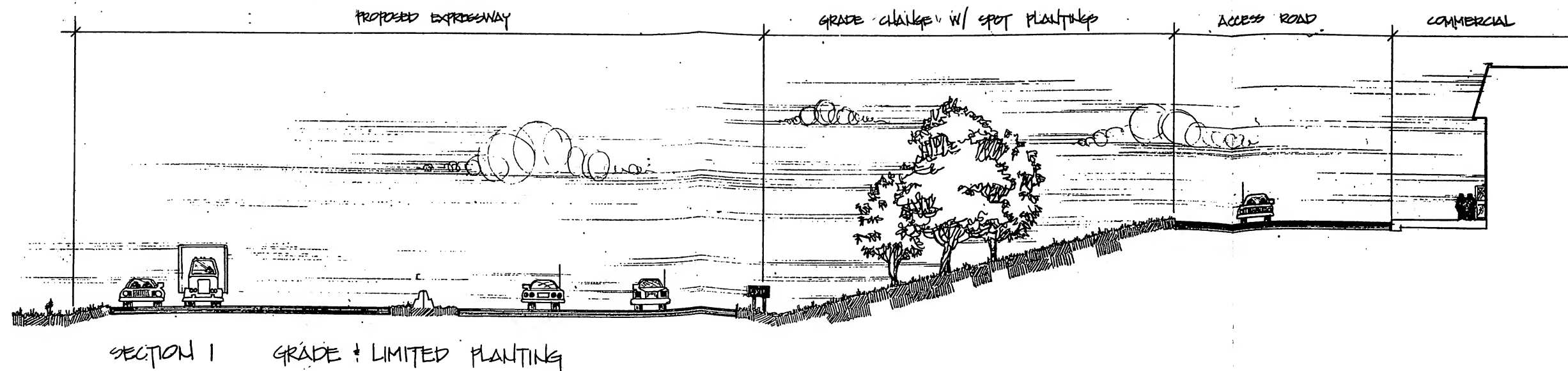
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Figure 11



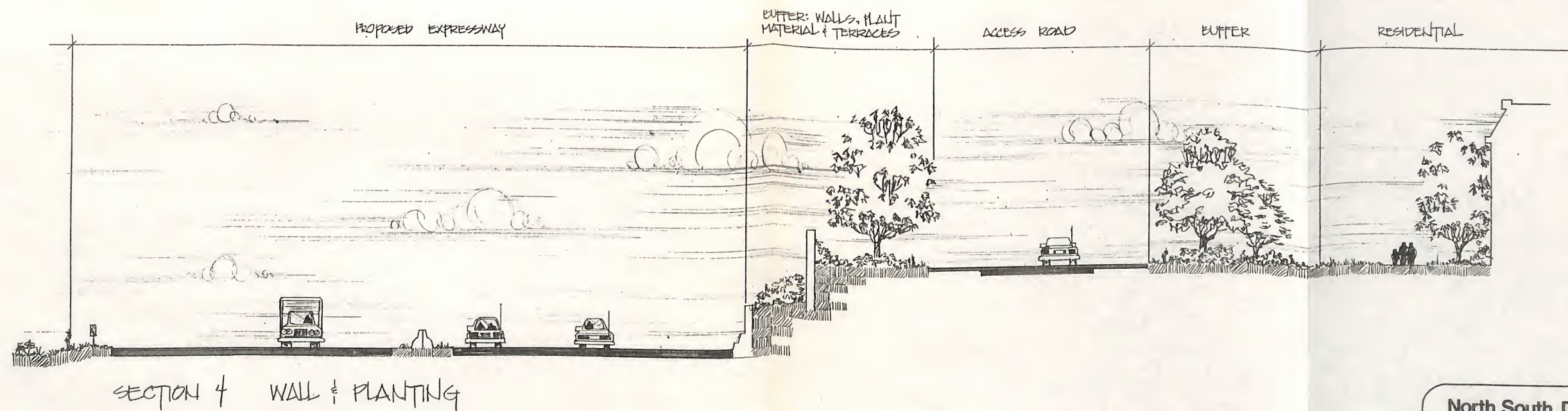
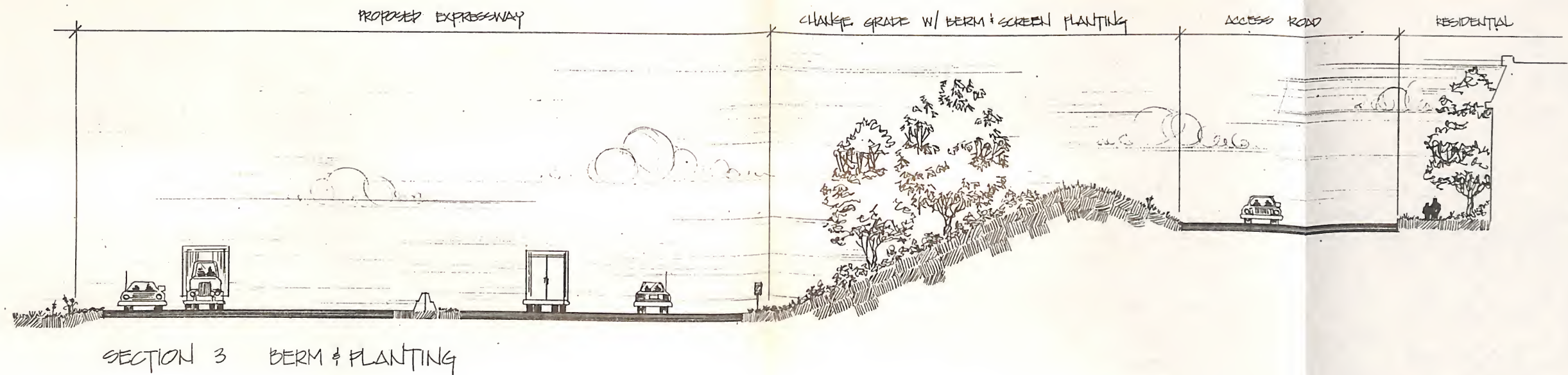
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Sections 1&2



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Sections 3&4